



Digital Signature Service Core Protocols, Elements, and Bindings Version 2.0

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Additional artifacts:

This prose specification is one component of a Work Product that also includes:

- JSON and XML schemas: <http://docs.oasis-open.org/dss-x/dss-core/v2.0/csprd01/schema/>

Related work:

This specification replaces or supersedes:

- *Digital Signature Service Core Protocols, Elements, and Bindings Version 1.0*. Edited by Stefan Drees. 11 April 2007. OASIS Standard. <http://docs.oasis-open.org/dss/v1.0/oasis-dss-core-spec-v1.0-os.html>.

Declared XML namespaces:

- <http://docs.oasis-open.org/dss-x/ns/core>
- <http://docs.oasis-open.org/dss-x/ns/base>

Abstract:

This document defines JSON and XML based request/response protocols for signing and verifying documents and other data. It also defines a timestamp format, and a signature property for use with these protocols. Finally, it defines transport and security bindings for the protocols.

Status:

This document was last revised or approved by the OASIS Digital Signature Services eXtended (DSS-X) TC on the above date. The level of approval is also listed above. Check the "Latest version" location noted above for possible later revisions of this document. Any other numbered Versions and other technical work produced by the Technical Committee (TC) are listed at https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=dss-x#technical.

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1 Introduction

[All text is normative unless otherwise labeled]

1.1 IPR Policy

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1.2 Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [\[RFC2119\]](#) and [\[RFC8174\]](#).

1.2.1 Terms and Definitions

For the purposes of this document no specific terms or definitions have been identified as deviating from the usual meaning in the context of XML / JSON schema, digital signatures or transport.

1.2.2 Abbreviated Terms

ASN.1	— Abstract Syntax Notation One
URI	— (IETF) Uniform Resource Identifier
XML	— (W3C) Extensible Markup Language
XSD	— (W3C) XML Schema

1.3 Normative References

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[DSIGRWXSD]	A. Kuehne, S. Hagen. <i>DSS 2.0 adapted XMLDSig XML Schema</i> . OASIS.
[DSS1Async]	A. Kuehne. <i>Asynchronous Processing Abstract Profile</i> . OASIS, oasis-dss-profiles-asynchronous_processing-spec-v1.0-os.html
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<http://www.ietf.org/rfc/rfc5652.txt>.
(Remark: As used in DSS, all implementations based upon RFC 5652 and previous releases of CMS will suffice. For the sake of simplicity the "urn:ietf:rfc:3369" is used throughout the document to indicate a CMS message as specified in RFC 5652 or RFC 3369 or any version (including PKCS #7).
- [RFC8174]** Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<http://www.rfc-editor.org/info/rfc8174>>.
- [RFC8259]** T. Bray, Ed., Google, Inc., The JavaScript Object Notation (JSON) Data Interchange Format, ISSN: 2070-1721, December 2017.
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1.4 Non-Normative References

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1.5 Typographical Conventions

Keywords defined by this specification use this `monospaced font`.

Normative source code uses this `paragraph style`.

Text following the special symbol («) – an opening Guillemet (or French quotation mark) – within this specification identifies automatically testable requirements to aid assertion tools. Every such statement is separated from the following text with the special end symbol (») – a closing Guillemet and has been assigned a reference that follows that end symbol in one of the three patterns:

1. **[DSS-section#-local#]** if it applies regardless of syntax
2. **[JDSS-section#-local#]** if it applies only to JSON syntax
3. **[XDSS-section#-local#]** if it applies only to XML syntax

Some sections of this specification are illustrated with non-normative examples.

Example 1: text describing an example uses this paragraph style

Non-normative examples use this paragraph style.

All examples in this document are non-normative and informative only.
Representation-specific text is indented and marked with vertical lines.

Representation-Specific Headline

Normative representation-specific text

All other text is normative unless otherwise labeled e.g. like:

Non-normative Comment:

This is a pure informative comment that may be present, because the information conveyed is deemed useful advice or common pitfalls learned from implementer or operator experience and often given including the rationale.

1.6 DSS Overview (Non-normative)

This specification describes two request/response protocols:

1. signing protocol
2. verifying protocol

Using the first protocol a client can send documents (or document hashes) to a server and receive back a signature on the documents. Using the second protocol a client can send documents (or document hashes) and a signature to a server and receive back an answer on whether the signature is valid or not.

The top-level components for the signing protocol are

- `SignRequest` (see section 4.2.6) as input and
- `SignResponse` (see section 4.2.7) as output.

For the verification protocol the top-level components are

- `VerifyRequest` (see section 4.2.10) as input and
- `VerifyResponse` (see section 4.2.11) as output.

Additionally, this version of the core includes asynchronous requests initially specified in the Asynchronous Processing Abstract Profile [\[DSSAsync\]](#).

The elements in which the protocols are formulated are provided in a semantic level and also in JSON and XML syntax. Provided are additional mappings from the generic to the specific entities.

These protocol operations could be useful in a variety of contexts – for example, they could allow clients to access a single corporate key for signing press releases, with centralized access control, auditing and archiving of signature requests. They could also allow clients to create and verify signatures without the need for complex client software and security-sensitive configuration.

The signing and verifying protocols are chiefly designed to support the creation and verification of XML signatures [\[XMLDSIG\]](#), XML timestamps (see [\[DSS1Core\]](#), section 5.1), binary timestamps [\[RFC 3161\]](#) and CMS signatures [\[RFC 5652\]](#). These protocols are intended to be extensible to other types of signatures and timestamps, such as PGP signatures [\[RFC 2440\]](#).

It is expected that the signing and verifying protocols will be *profiled* to meet many different application scenarios. In anticipation of this, these protocols have only a minimal set of required elements, which deal with transferring “input documents” and signatures back and forth between client and server. The input documents to be signed or verified can be transferred in their entirety or the client can hash the documents themselves and only send the hash values to save bandwidth and protect the confidentiality of the document content.

All functionality besides transferring input documents and signatures is relegated to a framework of “optional inputs” and “optional outputs”. This document defines a number of optional inputs and outputs. Profiles of these protocols can pick and choose which optional inputs and outputs to support and can

introduce their own optional inputs and outputs when they need functionality not anticipated by this specification.

Examples of optional inputs to the signing protocol include: what type of signature to produce, which key to sign with, who the signature is intended for, and what signed and unsigned properties to place in the signature. Examples of optional inputs to the verifying protocol include: the time for which the client would like to know the signature's validity status, additional validation data necessary to verify the signature (such as certificates and CRLs), and requests for the server to return information such as the signer's name or the signing time.

The signing and verifying protocol messages must be transferred over some underlying protocol(s) which provide message transport and security. A *binding* specifies how to use the signing and verifying protocols with some underlying protocol such as HTTP POST or TLS. Section 7 [Asynchronous Processing Model](#) provides an initial set of bindings.

The previous version of specification (**[DSS1Core]**) defines two elements that are related to these protocols. First, an XML timestamp element is defined in **[DSS1Core]**, section 5.1. The signing and verifying protocols can be used to create and verify both XML and binary timestamps; a profile for doing so is defined in **[XML-TSP]**. Second, a `RequesterIdentity` element is defined in (see **[DSS1Core]**, section 5.2). This element can be used as a signature property in an XML signature, to give the name of the end-user who requested the signature. These elements remain unchanged and are not repeated in this specification.

2 Design Considerations

2.1 Version 2.0 goal [non-normative]

The main changes of this version of the DSS/X core document compared to version 1.0 are:

- Considering the set of comments and bug reports arrived since version DSS 1.0 became standard
- Inclusion of requirements that became known only after publication of version 1.0
- Simplification of the core schema, e.g. by dropping elements seldom used
- Support for syntaxes other than XML
- Support transport formats other than SOAP
- Integration of the 'Asynchronous Processing Profile' [\[DSSAsync\]](#) into the core

Define a semantic model that can be mapped to different syntaxes. In this document the focus is on XML and JSON, but support for other syntaxes should be possible. Therefore, only the common denominator of syntax features can be used:

- Focus on Base64 as the most versatile way to transport documents and signatures
- Avoid the use of XML specifics (like e.g. mixed content)
- Provide namespace / URI for XPath evaluation explicitly
- Avoid `xs:any` by replacing it with an enumeration of possible types, and if that is not feasible, use base64 blobs as a fallback

To support implementers and to ease the use of the protocol with common frameworks the following list of requirements was compiled:

- One unique object model for all transport syntaxes
- Define type and cardinality of `OptionalInputs` and `OptionalOutputs` child elements explicitly
- Rearrange sequences and choices to produce a strongly typed object model

Regardless of the use of JSON as a transport syntax the handling of JSON signatures will not be covered by this document. Specific profiles will address signatures e.g. conformant to [\[RFC7515\]](#).

The provided schemes of DSS-X version 2 reflect these requirements. The XML schemes of version 1 and 2 share many similarities but are not compatible.

2.2 Transforming DSS 1.0 into 2.0

This section describes the several actions taken to fulfil the goals listed in the previous section.

2.2.1 Circumventing `xs:any`

The XML schema type 'any' allows an object to contain arbitrary structures. This comes handy for writers of specifications as an extension point because the structures transported don't need to be defined upfront. But this advantage at the specification stage comes with a price at the implementation stage. The structures intended to be supported by a client or a server system **MUST** be known to be implementable. But the usual tools for schema support leave the task of handling the content of an any type to the developer. Without extensive testing problems with unexpected content may occur at runtime, even while using typed languages.

As a successor of the `OptionalInputs` element (see section 2.7 of version 1.0 of this document) the component `OptionalInputsVerify` (see section 4.3.5) defines its child elements and their cardinality explicitly. When using additional profiles, the relevant components of the core schema can be redefined using the XML schema's 'redefine' element or JSON schema's 'allOf' as described in section 2.5.1 .

Another usage scenario for 'xs:any' is the transport of unknown data objects. As sample use case is the Property component (see section 4.3.17). This component is intended to contain signature attributes of unknown structure. In this version of the specification the 'xs:any' type is replaced by a structure containing base64-encoded data and meta data (component `Any`, see section 4.1.2). When using XML as

the transport syntax this seems to be a disadvantage. But direct XML fragment copying may introduce namespace problems and security concerns. Most importantly the cherry-picking of transport syntax features would inhibit a transport independent object model, both on the client and the server side. More complex programming and testing would be inevitable.

2.2.2 Substituting the mixed Schema Attribute

Mixing sub-elements and text within a single element is a great advantage of XML. But when XML is applied for serializing an object model this 'markup language' feature is of little use. Other serialization syntaxes (like JSON) don't support such a feature. There is the need to substitute the 'mixed' construct to become syntax independent. The substitution is done by removing the mixed attribute and introduce an additional 'value' element to contain the textual content.

2.2.3 Introducing the `NsPrefixMappingType` Component

Namespaces are an outstanding feature of the XML world. A replacement is required for all syntaxes that don't such a feature. The use of naming conventions and prefixes are used to avoid naming collisions. A special challenge is the use of XPath-Expression as elements. The XPath expression itself is represented as a simple string. But the expression may depend on namespace/prefix mappings that are defined within the namespace context of the XML element. The `NsPrefixMappingType` component (see section 4.1.1) represents the required namespace/prefix mapping. It is recommended to use this element for XML syntax, too. This simplifies the handling on the consumer side and circumvents problems with namespace prefix assignments handled by web frameworks.

2.2.4 Imported XML schemes

A special challenge is imposed by the imported schemes, like the [XMLDSIG] scheme, that uses features not supportable by the mentioned 'multi-syntax' approach. For example, the [XMLDSIG] type 'Transform' is defined like this:

```
<xs:complexType name="TransformType" mixed="true">
  <xs:choice minOccurs="0" maxOccurs="unbounded">
    <xs:any namespace="##other" processContents="lax"/>
    <!-- (1,1) elements from (0,unbounded) namespaces -->
    <xs:element name="XPath" type="string"/>
  </xs:choice>
  <xs:attribute name="Algorithm" type="xs:anyURI" use="required"/>
</xs:complexType>
```

Most of the restrictions listed above do apply here:

- The `complexType` may contain mixed content (child elements **and** text). This concept is not supported by JSON. The workaround for this limitation is to drop the 'mixed' attribute and to introduce a 'value' element.
- The `choice` construct is mapped in an untyped way by Java's JAXB framework. Therefore, the `choice` element is changed to a `sequence`.
- The `any` type is replaced by a base64 encoded blob.
- The option to provide arbitrary namespace / prefix mappings to support the evaluation of XPath expression is not available in e.g. JSON syntax. Therefore an element mapping prefixes to namespaces (of type `dsb:NsPrefixMappingType`) is added.


```

<xs:complexType name="TransformType">
  <xs:sequence>
    <xs:element maxOccurs="1" minOccurs="0" name="value" type="string"/>
    <xs:element maxOccurs="1" minOccurs="0" name="Base64Content"
      type="xs:base64Binary"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="XPath"
      type="string"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="NsPrefixMapping"
      type="dsb:NsPrefixMappingType"/>
  </xs:sequence>
  <xs:attribute name="Algorithm" type="xs:string" use="required"/>
</xs:complexType>

```

To apply the necessary changes to the imported schemes the XML schema language provides the `override` functionality to change existing schemes. But Java's JAXB framework's schema compiler does not support `override` so the adapted schemes are provided alongside DSS-X core schemes.

2.2.5 Syntax variants

This version of the DSS/X core document handles the representation of requests and response elements according to the JSON and XML syntax. The general semantics of the elements is discussed in the element's main section. Details of the JSON or XML formats are discussed in specific subsections

- Component – JSON Syntax
- Component – XML Syntax

2.2.6 JSON Syntax Extensions

JSON, as described in [\[RFC8259\]](#), defines a text format for serializing structured data. Objects are serialized as an unordered collection of name/value pairs.

JSON does not define any semantics around the name/value pairs that make up an object, nor does it define an extensibility mechanism for adding control information to a payload.

DSS's JSON format extends JSON by defining general conventions for name/value pairs that annotate a JSON object, property or array. DSS defines a set of canonical annotations for control information such as ids, types, and links, and custom annotations MAY be used to add domain-specific information to the payload.

Annotations are used in JSON to capture control information that cannot be predicted as well as a mechanism to provide values where a computed value would be wrong.

2.3 Construction Principles

2.3.1 Multi Syntax approach

In the years since DSS 1.0 became standard many other formats (like JSON) became popular for data interchange. Nevertheless, XML is still an important and commonly used format. To support these developments DSS 2.0 is taking a multi-syntax approach:

- For each structural component there is semantic section describing the elements, restrictions and relations to other components in a syntax-neutral way.
- Following the semantic definition there are syntax-specific sections describing the mapping of the given requirements to [XML](#) and [JSON](#).
- Schemes are provided for XML and JSON.
- Element name mappings are given for JSON.

Subsequent versions of this protocol may define additional syntax mappings, e.g. for [ASN.1](#) or [CBOR](#).

The restriction of this approach is limitation to the common denominator of capabilities of the used transfer formats. The section 'Transforming DSS 1.0 into 2.0' targets these limitations. The imported schema files defined by other parties are also affected. An example is the 'Component Transform', that

was originally defined in [XMLDSIG] and the aspects described in 2.2.1 Circumventing xs:any, 2.2.2 Substituting the mixed Schema Attribute and 2.2.3 Introducing the NsPrefixMappingType Component apply.

2.4 Schema Organization and Namespaces

The structures described in this specification are contained in the schema file [Core2.0-XSD]. All schema listings in the current document are excerpts from the schema file. In the case of a disagreement between the schema file and this document, the schema file shall take precedence.

This schema is associated with the following XML namespace

```
http://docs.oasis-open.org/dss-x/ns/base
```

and

```
http://docs.oasis-open.org/dss-x/ns/core
```

If a future version of this specification is needed, it will use a different namespace.

Conventional XML namespace prefixes are used in the schema:

- The prefix `dss2`: stands for the DSS core version 2.0 namespace [DSS2XSD].refDSS2XSD
- The prefix `dsb`: stands for the DSS base namespace [DSBXSD].refDSS2XSD
- The prefix `ds-rw`: stands for a namespace of elements based on the W3C XML Signature [XMLDSIG].
- The prefix `xs`: stands for the W3C XML Schema namespace [Schema1].
- The prefix `saml2-rw`: stands for a namespace of elements based on the OASIS SAML 2 Schema namespace [SAMLCore2.0].

Applications MAY use different namespace prefixes, and MAY use whatever namespace defaulting/scoping conventions they desire, as long as they are compliant with the Namespaces in XML specification [XML-ns].

The following schema fragment defines the XML namespaces and other header information for the DSS core schema:

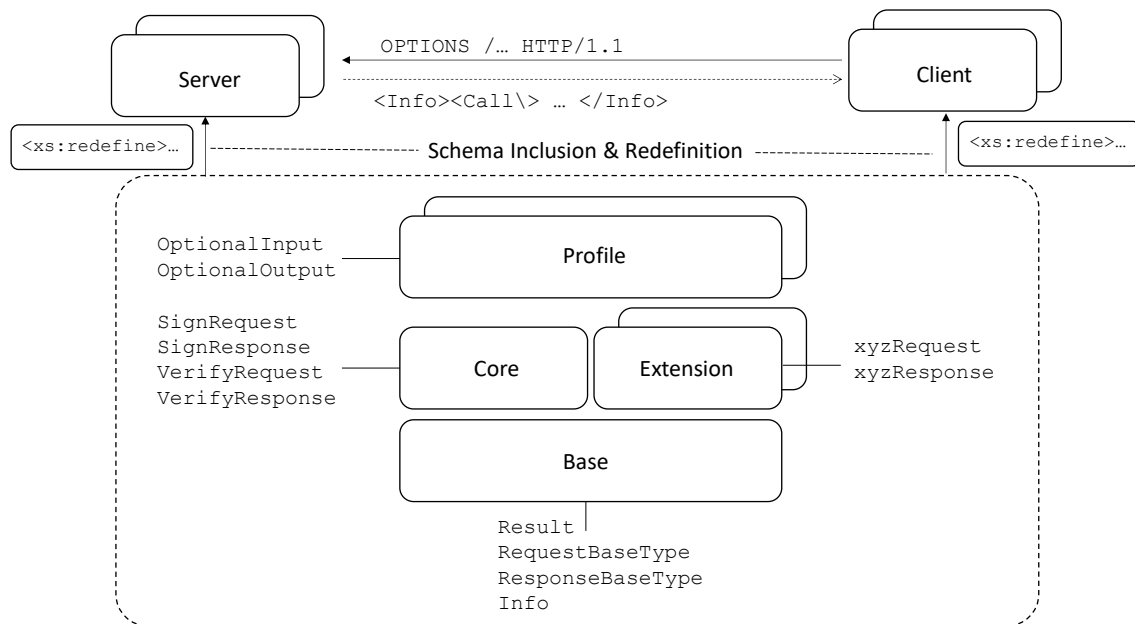
```
<xs:schema xmlns:dss2="http://docs.oasis-open.org/dss-x/ns/core"
  xmlns:dsb="http://docs.oasis-open.org/dss-x/ns/base"
  xmlns:ds-rw="http://docs.oasis-open.org/dss-x/ns/xmlsig/rewritten"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:saml2-rw="http://docs.oasis-open.org/dss-x/ns/SAML_1.0/assertion/rewritten"
  xmlns:saml2-rw="http://docs.oasis-open.org/dss-x/ns/saml2/rewritten"
  targetNamespace="http://docs.oasis-open.org/dss-x/ns/core"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation xml:lang="en">This Schema defines the Digital Signature Service Core
    Protocols, Elements, and Bindings Committee Draft 1 for Public Review</xs:documentation>
  </xs:annotation>
  <xs:import namespace="http://docs.oasis-open.org/dss-x/ns/xmlsig/rewritten"
    schemaLocation="xmlsig-core-schema-dss-rw.xsd"/>
  <xs:import namespace="http://docs.oasis-open.org/dss-x/ns/SAML_1.0/assertion/rewritten"
    schemaLocation="oasis-sstc-saml-schema-protocol-1.1-dss-rw.xsd"/>
  <xs:import namespace="http://docs.oasis-open.org/dss-x/ns/saml2/rewritten"
    schemaLocation="saml-schema-assertion-2.0-dss-rw.xsd"/>
  <xs:import namespace="http://www.w3.org/XML/1998/namespace"
    schemaLocation="http://www.w3.org/2001/xml.xsd"/>
```

2.5 DSS Component Overview

The DSS core is designed to be extended by profiles to support additional functionalities. The DSS specification comes with a set of profiles (see <https://www.oasis-open.org/standards#dssv1.0>). With version 2.0 there will be extensions to augment the use cases beyond the sign and verify scope of the previous version. The extensions will define other requests and responses while using e.g. the

ResultType. A sample for an extension is the ChipGateway Protocol (c.f. clause 3.4 of [CHPGW]). To support this approach, the DSS 2.0 schema is split into a generic 'base' and the more specific 'core' schema.

Figure 1:Component overview



The diagram above shows the relationship between the different building blocks.

2.5.1 Schema Extensions

Most profiles define additional OptionalInputs or OptionalOutputs. To support a type-safe extension of the set of optional elements it is recommended to use the XML schema `redefine` mechanism to extend the core schema and derive the related JSON schema from it:

```
<xs:redefine schemaLocation="core-schema.xsd">
  <xs:complexType name="dss:OptionalOutputsVerifyType">
    <xs:complexContent>
      <xs:extension base="dss:OptionalOutputsVerifyType">
        <xs:group ref="prf:optionalOutputGroup"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:redefine>
```

The snippet above extends the set of sub-components of `OptionalOutputsVerifyType` with the group of elements of the profile.

In a similar way extension of the core's JSON scheme can be performed by using the 'allOf' keyword:

```

"dss2-OptionalOutputsVerifyType": {
  "allOf": [
    {"$ref": "#/definitions/prf-OptionalElement"},
    {
      "type": "object",
      "properties": {
        "policy": {
          "type": "array",
          "items": {
            "type": "string"
          }
        },
        // [...]
      }
    }
  ]
}

```

With this mechanism it is possible to extend the core schema to specific requirements while preserving the advantage of type safety and tool / IDE support. This sample illustrates the use of 'extension'. in the same way `restriction` can be applied. In more complex scenarios (e.g. multiple profiles apply, need for extending **and** restriction the core schema) the use of other techniques (e.g. XSLT) may be required.

It may be useful to process a profile (or a set of profiles) using a distinct endpoint. This enables the server instance to provide a specific WSDL including an appropriate schema with all profile-related elements.

3 Data Type Models

3.1 Boolean Model

The boolean data type is used to specify a true or false

3.2 Integer Model

The integer data type is used to specify a numeric value without a fractional component.

3.3 String Model

The string data type can represent characters, line feeds, carriage returns, and tab characters.

3.4 Binary Data Model

The base64Binary type holds Base64-encoded binary data

3.5 URI Model

Uniform Resource Identifier (URI) is a string of characters used to identify a resource

3.6 Unique Identifier Model

A unique identifier is a numeric or alphanumeric string that is associated with a single entity within a given system.

3.7 Date and Time Model

The specific concept of date and time used in this document is defined in this section and noted in subsequent usage as:

DateTime

« All date time values inside a DSS document MUST adhere to the ISO 8601 [\[ISO8601\]](#) basic or extended Format (as given there in section 4.3.2 “Complete representations” and with the addition of decimal fractions for seconds, similar to *ibid.* section 4.2.2.4 “Representations with decimal fraction” but with the full stop (.) being the preferred separator for DSS). » [\[DSS-3.7-1\]](#).

3.8 Lang Model

The specific concept of language used in this document is defined in this section and noted in subsequent usage as:

Language

« All language values inside a DSS document MUST adhere to the ISO 639-1 [\[ISO639-1\]](#) format (as given there in section 4 “Two-letter language code”. » [\[DSS-3.8-1\]](#).

4 Data Structure Models

4.1 Data Structure Models defined in this document

The XML elements of this section are defined in the XML namespace:

<http://docs.oasis-open.org/dss-x/ns/base>

4.1.1 Component `NsPrefixMapping`

The `NsPrefixMapping` component defines the mapping of namespace URIs to namespace prefixes. This is required to evaluate XPath expression when using transport syntaxes that don't support namespace.

Below follows a list of the sub-components that MAY be present within this component:

- « The `NamespaceURI` element SHALL contain one instance of a URI. » [DSS-4.1.1-1].
- « The `NamespacePrefix` element SHALL contain one instance of a string. » [DSS-4.1.1-2].

4.1.1.1 `NsPrefixMapping` – JSON Syntax

« The `NsPrefixMappingType` JSON object SHALL implement in JSON syntax the requirements defined in the `NsPrefixMapping` component. » [JDSS-4.1.1.1-1].

« Properties of the JSON object SHALL implement the sub-components of `NsPrefixMapping` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>NamespaceURI</code>	<code>uri</code>
<code>NamespacePrefix</code>	<code>pre</code>

» [JDSS-4.1.1.1-2]. The `NsPrefixMappingType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dsb-NsPrefixMappingType": {
  "type": "object",
  "properties": {
    "uri": {
      "type": "string"
    },
    "pre": {
      "type": "string"
    }
  },
  "required": ["uri", "pre"]
}
```

4.1.1.2 `NsPrefixMapping` – XML Syntax

« The XML type `NsPrefixMappingType` SHALL implement the requirements defined in the `NsPrefixMapping` component. » [XDSS-4.1.1.2-1].

The `NsPrefixMappingType` XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```
<xs:complexType name="NsPrefixMappingType">
  <xs:sequence>
    <xs:element name="NamespaceURI" type="xs:anyURI"/>
    <xs:element name="NamespacePrefix" type="xs:string"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of NsPrefixMappingType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.1.2-2].

4.1.2 Component Any

« This element SHALL hold a set of base64 encoded arbitrary data if it is present. » [DSS-4.1.2-1]. To help the processing of the data it can be further qualified by the mime type element.

Below follows a list of the sub-components that are allowed to be present within this component:

A set of sub-components is inherited from component 4.1.6 and is not repeated here.

Non-normative Comment:

This component was introduced in DSS core version 1.0 and is used as a placeholder for arbitrary data. In version 1.0 there were different ways defined to represent the data, e.g. as inline XML, encapsulated XML or base64 encoded. The expansion of the scope to different syntaxes limits the options to base64 encoded data or attachments as represented in Base64Data. In this version the component Any does not use additional subcomponents.

4.1.2.1 Any – JSON Syntax

« The AnyType JSON object SHALL implement in JSON syntax the requirements defined in the Any component. » [JDSS-4.1.2.1-1].

The AnyType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dsb-AnyType": {
  "type": "object",
  "properties": {
    "ID": {
      "type": "string"
    },
    "val": {
      "type": "string"
    },
    "attRef": {
      "$ref": "#/definitions/dsb-AttachmentReferenceType"
    },
    "mimeType": {
      "type": "string"
    },
    "idRef": {
      "type": "string"
    }
  }
}
```

4.1.2.2 Any – XML Syntax

« The XML type AnyType SHALL implement the requirements defined in the Any component. » [XDSS-4.1.2.2-1].

The AnyType XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```
<xs:complexType name="AnyType">
  <xs:complexContent>
    <xs:extension base="dsb:Base64DataType"/>
  </xs:complexContent>
</xs:complexType>
```

« Each child element of AnyType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.2.2-2].

4.1.3 Component InternationalString

This element attaches an element to a human-readable string to specify the string's language.

Below follows a list of the sub-components that are allowed to be present within this component:

- « The value element SHALL contain one instance of a string. » [DSS-4.1.3-1]. The human readable string. In non-XML representations the value element contains the textual content.
- « The lang element SHALL contain one instance of a ISO language descriptor. » [DSS-4.1.3-2]. This element identifies the language of the value element.

4.1.3.1 InternationalString – JSON Syntax

« The InternationalStringType JSON object SHALL implement in JSON syntax the requirements defined in the InternationalString component. » [JDSS-4.1.3.1-1].

« Properties of the JSON object SHALL implement the sub-components of InternationalString using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
value	value
lang	lang

» [JDSS-4.1.3.1-2]. The InternationalStringType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dsb-InternationalStringType": {
  "type": "object",
  "properties": {
    "value": {
      "type": "string"
    },
    "lang": {
      "type": "string"
    }
  },
  "required": ["lang"]
}
```

4.1.3.2 InternationalString – XML Syntax

« The XML type InternationalStringType SHALL implement the requirements defined in the InternationalString component. » [XDSS-4.1.3.2-1].

The `InternationalStringType` XML element is defined in XML Schema [DSBXSD] and is copied below a service for the reader.

```
<xs:complexType name="InternationalStringType">
  <xs:simpleContent>
    <xs:extension base="xs:string">
      <xs:attribute ref="xml:lang" use="required"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
```

« Each child element of `InternationalStringType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.3.2-2]. The element 'value' is represented by the component's XML tag text content.

4.1.4 Component DigestInfo

The `DigestInfo` component holds a digest value and an identification of the used digest algorithm. The `DigestMethod` isn't strongly typed intentionally to support a broad variety of identifiers.

Below follows a list of the sub-components that are allowed to be present within this component:

- « The `DigestMethod` element SHALL contain one instance of a string. » [DSS-4.1.4-1]. The string describes the digest algorithm in an appropriate way for the server-side processing. Depending on the signature format this can either be an OID (e.g. 2.16.840.1.101.3.4.2.1), an URI (e.g. <http://www.w3.org/2001/04/xmlenc#sha256>) or a descriptive string ('SHA-256').
- « The `DigestValue` element SHALL contain one instance of base64 encoded binary data. » [DSS-4.1.4-2].

4.1.4.1 DigestInfo – JSON Syntax

« The `DigestInfoType` JSON object SHALL implement in JSON syntax the requirements defined in the `DigestInfo` component. » [JDSS-4.1.4.1-1].

« Properties of the JSON object SHALL implement the sub-components of `DigestInfo` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>DigestMethod</code>	alg
<code>DigestValue</code>	val

» [JDSS-4.1.4.1-2]. The `DigestInfoType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dsb-DigestInfoType": {
  "type": "object",
  "properties": {
    "alg": {
      "type": "string"
    },
    "val": {
      "type": "string"
    }
  },
  "required": ["alg", "value"]
}

```

4.1.4.2 DigestInfo – XML Syntax

« The XML type `DigestInfoType` SHALL implement the requirements defined in the `DigestInfo` component. » [XDSS-4.1.4.2-1].

The `DigestInfoType` XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```

<xs:complexType name="DigestInfoType">
  <xs:sequence>
    <xs:element name="DigestMethod" type="xs:string"/>
    <xs:element name="DigestValue" type="xs:base64Binary"/>
  </xs:sequence>
</xs:complexType>

```

« Each child element of `DigestInfoType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.4.2-2].

4.1.5 Component AttachmentReference

Applications MAY support SOAP 1.2 attachment feature [SOAPAtt] or other attachment specifications (e.g. [SOAPMtom]) to transmit documents.

Below follows a list of the sub-components that MAY be present within this component:

The optional `DigestInfo` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.1.4. » [DSS-4.1.5-1] An element of this type can be used to ensure the integrity of the attachment data. If these elements are supplied the server SHOULD compute a message digest using the algorithm given in `DigestMethod` over the binary data in the octet stream and compare it against the supplied `DigestValue`. If the comparison fails then a `RequesterError` qualified by a `GeneralError` and an appropriate message containing the `AttRefURI` is returned.

« The `AttRefURI` element MUST contain one instance of a URI. » [DSS-4.1.5-2] SOAP 1.2 attachment feature [SOAPAtt] states that any secondary part ("attachment") can be referenced by a URI of any URI scheme. « `AttRefURI` refers to such a secondary part ("attachment") and MUST resolve within the compound SOAP message. » [DSS-4.1.5-3] The default encapsulation mechanism is MIME as specified in the WS-I Attachments Profile [WS-I-Att] (cf. http://www.ws-i.org/Profiles/AttachmentsProfile-1.0.html#Referencing_Attachments_from_the_SOAP_Envelope).

4.1.5.1 AttachmentReference – JSON Syntax

« The AttachmentReferenceType JSON object SHALL implement in JSON syntax the requirements defined in the AttachmentReference component. » [JDSS-4.1.5.1-1]

« Properties of the JSON object SHALL implement the sub-components of AttachmentReference using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
DigestInfo	di
AttRefURI	attURI

» [JDSS-4.1.5.1-2] The AttachmentReferenceType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dsb-AttachmentReferenceType": {
  "type": "object",
  "properties": {
    "di": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-DigestInfoType"
      }
    },
    "attURI": {
      "type": "string"
    }
  },
  "required": ["attURI"]
}
```

4.1.5.2 AttachmentReference – XML Syntax

« The XML type AttachmentReferenceType SHALL implement the requirements defined in the AttachmentReference component. » [XDSS-4.1.5.2-1]

The AttachmentReferenceType XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```
<xs:complexType name="AttachmentReferenceType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="DigestInfo"
      type="dsb:DigestInfoType"/>
  </xs:sequence>
  <xs:attribute name="AttRefURI" type="xs:anyURI" use="required"/>
</xs:complexType>
```

« Each child element of AttachmentReferenceType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.5.2-2]

4.1.6 Component Base64Data

The Base64Data component is a generic holder for arbitrary data. In addition to the data itself it also contains additional elements to qualify the MimeType of the data. It also offers an Id / Reference pair to implement a deduplication strategy, useful especially for bigger data blobs. The content is contained inside the mutually exclusive elements Value or AttRefURI.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `Value` element MUST contain one instance of base64 encoded binary data. » [DSS-4.1.6-1] This element holds an instance of generic content. This could be a document to be signed, a signature, a schema or other data.
- « The optional `AttRef` element MUST contain one instance of a sub-component. » [DSS-4.1.6-2] « This element MUST satisfy the requirements specified in this document in section 4.1.5. » [DSS-4.1.6-3] This element allows to reference content that is transferred in a non-inlined way. These mechanisms may take advantage of optimizations (e.g. optimized transfer encodings). The content of MAY be integrity-protected by a message digest.
- « The optional `MimeType` element MUST contain one instance of a string. » [DSS-4.1.6-4] This element is denoting the type of the arbitrary data in the value element or the referenced attachment.
- « The optional `Id` element MUST contain one instance of a unique identifier. » [DSS-4.1.6-5] This identifier gives the binary data a unique label within a particular message. Using this identifier and the `IdRef` element it is possible to avoid redundant content.
- « The optional `IdRef` element MUST contain one instance of a unique identifier reference. » [DSS-4.1.6-6] This element identifies another binary data element within a particular message.

Non-normative Comment:

There are different standards defined for handling and referencing an attachment. Maybe there will be more to come. Therefore, the attachment reference mechanism is somehow generic here. Note: If MIME is used as encapsulation mechanism, the MIME content-type is available via a MIME header. However, the MIME headers may not be available to implementations and the SOAP 1.2 attachment feature is not restricted to MIME. Further the MIME header is not secured by the `AttachmentReference's DigestInfo`, which is calculated over the binary attachment data (not including the MIME headers).

4.1.6.1 Base64Data – JSON Syntax

- « The `Base64DataType` JSON object SHALL implement in JSON syntax the requirements defined in the `Base64Data` component. » [JDSS-4.1.6.1-1]
- « Properties of the JSON object SHALL implement the sub-components of `Base64Data` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>Value</code>	<code>val</code>
<code>AttRef</code>	<code>attRef</code>
<code>MimeType</code>	<code>mimeType</code>
<code>Id</code>	<code>ID</code>
<code>IdRef</code>	<code>idRef</code>

- » [JDSS-4.1.6.1-2] The `Base64DataType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dsb-Base64DataType": {
  "type": "object",
  "properties": {
    "ID": {
      "type": "string"
    },
    "val": {
      "type": "string"
    },
    "attRef": {
      "$ref": "#/definitions/dsb-AttachmentReferenceType"
    },
    "mimeType": {
      "type": "string"
    },
    "idRef": {
      "type": "string"
    }
  },
  "minProperties": 0
}

```

4.1.6.2 Base64Data – XML Syntax

« The XML type `Base64DataType` SHALL implement the requirements defined in the `Base64Data` component. » [XDSS-4.1.6.2-1]

The `Base64DataType` XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```

<xs:complexType name="Base64DataType">
  <xs:choice minOccurs="0">
    <xs:element name="Value" type="xs:base64Binary"/>
    <xs:element name="AttRef" type="dsb:AttachmentReferenceType"/>
  </xs:choice>
  <xs:attribute name="MimeType" type="xs:string" use="optional"/>
  <xs:attribute name="Id" type="xs:ID" use="optional"/>
  <xs:attribute name="IdRef" type="xs:IDREF" use="optional"/>
</xs:complexType>

```

« Each child element of `Base64DataType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.6.2-2]

4.1.7 Component Result

The `Result` element is returned with every response message.

Below follows a list of the sub-components that MAY be present within this component:

« The `ResultMajor` element MUST contain one instance of a URI. Its value is limited to an item of the following set:

urn:oasis:names:tc:dss:1.0:resultmajor:Success
 urn:oasis:names:tc:dss:1.0:resultmajor:RequesterError
 urn:oasis:names:tc:dss:1.0:resultmajor:ResponderError
 urn:oasis:names:tc:dss:1.0:resultmajor:InsufficientInformation
 urn:oasis:names:tc:dss:1.0:profiles:asynchronousprocessing:resultmajor:Pending
 » [DSS-4.1.7-1]

The `ResultMajor` element describes the most significant component of the result code. The set values MAY be extended.

- « The optional `ResultMinor` element MUST contain a URI. » [DSS-4.1.7-2]
- « The optional `ResultMessage` element MUST contain a sub-component. » [DSS-4.1.7-3] « A given element MUST satisfy the requirements specified in this document in section 4.1.3. » [DSS-4.1.7-4] It represents a message which MAY be returned to an operator, logged by the client, used for debugging, etc.
- « The optional `ProblemReference` element MUST contain a string. » [DSS-4.1.7-5] In the case of processing problems, the server MAY give a reference to processing details (e.g. for debugging purposes) but does not want to disclose sensitive information, this element can be used. It MAY contain a random string that links the current request to internal logs, processing protocols or crash dumps.

4.1.7.1 Result – JSON Syntax

« The `ResultType` JSON object SHALL implement in JSON syntax the requirements defined in the `Result` component. » [JDSS-4.1.7.1-1]

« Properties of the JSON object SHALL implement the sub-components of `Result` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
ResultMajor	<code>maj</code>
ResultMinor	<code>min</code>
ResultMessage	<code>msg</code>
ProblemReference	<code>pRef</code>

» [JDSS-4.1.7.1-2] The `ResultType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dsb-ResultType": {
  "type": "object",
  "properties": {
    "maj": {
      "type": "string",
      "enum": ["urn:oasis:names:tc:dss:1.0:resultmajor:Success",
"urn:oasis:names:tc:dss:1.0:resultmajor:RequesterError",
"urn:oasis:names:tc:dss:1.0:resultmajor:ResponderError",
"urn:oasis:names:tc:dss:1.0:resultmajor:InsufficientInformation",
"urn:oasis:names:tc:dss:1.0:profiles:asynchronousprocessing:resultmajor:Pending"]
    },
    "min": {
      "type": "string"
    },
    "msg": {
      "$ref": "#/definitions/dsb-InternationalStringType"
    },
    "pRef": {
      "type": "string"
    }
  },
  "required": ["maj"]
}
```

4.1.7.2 Result – XML Syntax

« The XML type `ResultType` SHALL implement the requirements defined in the `Result` component. » [XDSS-4.1.7.2-1]

The `ResultType` XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```
<xs:complexType name="ResultType">
  <xs:sequence>
    <xs:element name="ResultMajor">
      <xs:simpleType>
        <xs:restriction base="xs:anyURI">
          <xs:enumeration
value="urn:oasis:names:tc:dss:1.0:resultmajor:Success"/>
          <xs:enumeration
value="urn:oasis:names:tc:dss:1.0:resultmajor:RequesterError"/>
          <xs:enumeration
value="urn:oasis:names:tc:dss:1.0:resultmajor:ResponderError"/>
          <xs:enumeration
value="urn:oasis:names:tc:dss:1.0:resultmajor:InsufficientInformation"/>
          <xs:enumeration
value="urn:oasis:names:tc:dss:1.0:profiles:asynchronousprocessing:resultmajor:
Pending"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <xs:element minOccurs="0" name="ResultMinor" type="xs:anyURI"/>
    <xs:element minOccurs="0" name="ResultMessage"
      type="dsb:InternationalStringType"/>
    <xs:element minOccurs="0" name="ProblemReference" type="xs:string"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `ResultType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.7.2-2]

4.1.8 Component OptionalInputs

Non-normative Comment:

Note, that the prescribed font family renders a lowercase letter L and an uppercase letter i nearly the same. So, for clarity it is stated here, that the component described in this section is the combination of the words Optional and Inputs.

Below follows a list of the sub-components that MAY be present within this component:

The optional `ServicePolicy` element MAY occur zero or more times containing a URI. « This element allows the client to define a set of policies under which the server MUST perform the requested operation. » [DSS-4.1.8-1] The policy may include information on the characteristics of the server that are not covered by the `Profile` element. The `ServicePolicy` element may be used to select a specific policy if a service supports multiple policies for a specific profile, or as a sanity-check to make sure the server implements the policy the client expects.

« The optional `Language` element MUST contain an ISO language descriptor. » [DSS-4.1.8-2] The `Language` element indicates which language the client would like to receive `InternationalString` values in. The server should return appropriately localized strings, if possible.

The optional `Other` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.1.2. » [DSS-4.1.8-3] The element `Other` may contain arbitrary content that may be specified in a profile and can be used to extend the Protocol.

4.1.8.1 OptionalInputs – JSON Syntax

The component `OptionalInputs` is used as a base type only, not as a JSON instance.

4.1.8.2 OptionalInputs – XML Syntax

« The XML type `OptionalInputsType` SHALL implement the requirements defined in the `OptionalInputs` component. » [XDSS-4.1.8.2-1]

The `OptionalInputsType` XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```
<xs:complexType name="OptionalInputsType">
  <xs:sequence>
    <xs:choice>
      <xs:element maxOccurs="unbounded" minOccurs="0" name="ServicePolicy"
        type="xs:anyURI"/>
      <xs:element maxOccurs="1" minOccurs="0" name="Language"
        type="xs:language"/>
      <xs:element maxOccurs="unbounded" minOccurs="0" name="Other"
        type="dsb:AnyType"/>
    </xs:choice>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `OptionalInputsType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.8.2-2]

4.1.9 Component OptionalOutputs

Below follows a list of the sub-components that MAY be present within this component:

The optional `AppliedPolicy` element MAY occur zero or more times containing a URI. This element lists the set of DSS policies used by the server.

The optional `Other` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.1.2. » [DSS-4.1.9-1] Other may contain arbitrary content that may be specified in a profile and can be used to extend the Protocol.

4.1.9.1 OptionalOutputs – JSON Syntax

The component `OptionalOutputs` is used as a base type only, not as a JSON instance.

4.1.9.2 OptionalOutputs – XML Syntax

« The XML type `OptionalOutputsType` SHALL implement the requirements defined in the `OptionalOutputs` component. » [XDSS-4.1.9.2-1]

The `OptionalOutputsType` XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```
<xs:complexType name="OptionalOutputsType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="AppliedPolicy"
      type="xs:anyURI"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="Other"
      type="dsb:AnyType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `OptionalOutputsType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.9.2-2]

4.1.10 Component RequestBase

The `RequestBase` component is the base structure for request elements defined by the core protocol or profiles.

Below follows a list of the sub-components that MAY be present within this component:

The optional `Profile` element MAY occur zero or more times containing a URI. This element indicates a set of DSS profiles. It is used by the client to select profiles the server supports.

« The optional `RequestID` element MUST contain one instance of a string. » [DSS-4.1.10-1]

The `RequestID` element is used to correlate requests with responses.

« When present in a request, the server MUST return it in the response. » [DSS-4.1.10-2]

4.1.10.1 RequestBase – JSON Syntax

The component `RequestBase` is abstract and therefore has no JSON definition.

4.1.10.2 RequestBase – XML Syntax

« The XML type `RequestBaseType` SHALL implement the requirements defined in the `RequestBase` component. » [XDSS-4.1.10.2-1]

The `RequestBaseType` XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```
<xs:complexType abstract="true" name="RequestBaseType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="Profile"
      type="xs:anyURI"/>
  </xs:sequence>
  <xs:attribute name="RequestID" type="xs:string" use="optional"/>
</xs:complexType>
```

« Each child element of `RequestBaseType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.10.2-1]

4.1.11 Component ResponseBase

The `ResponseBase` component is the base structure for response elements defined by the core protocol or profiles.

Below follows a list of the sub-components that MAY be present within this component:

- « The `Result` element MUST contain one instance of a sub-component. » [DSS-4.1.11-1]
- « This element MUST satisfy the requirements specified in this document in section 4.1.7 **Component Result**. » [DSS-4.1.11-2] The `Result` element represents the status of the request. The optional `AppliedProfile` element MAY occur zero or more times containing a URI. This element lists the set of DSS profile applied by the server. This set MAY include the set of profiles requested by the client. But the server MAY use more comprehensive set of profiles and add additional profiles not requested by the client.
- « The optional `RequestID` element MUST contain one instance of a string. » [DSS-4.1.11-3]
The `RequestID` element is used to correlate this response with its request.
- « The optional `ResponseID` element MUST contain one instance of a string. » [DSS-4.1.11-4]
The `ResponseID` element

4.1.11.1 ResponseBase – JSON Syntax

« The `ResponseBaseType` JSON object SHALL implement in JSON syntax the requirements defined in the `ResponseBase` component. » [JDSS-4.1.11.1-1]

« Properties of the JSON object SHALL implement the sub-components of `ResponseBase` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Result	<code>result</code>
AppliedProfile	<code>profile</code>
RequestID	<code>reqID</code>
ResponseID	<code>respID</code>

» [JDSS-4.1.11.1-2] The `ResponseBaseType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dsb-ResponseBaseType": {
  "type": "object",
  "properties": {
    "result": {
      "$ref": "#/definitions/dsb-ResultType"
    },
    "profile": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "reqID": {
      "type": "string"
    },
    "respID": {
      "type": "string"
    }
  },
  "required": ["result"]
}
```

4.1.11.2 ResponseBase – XML Syntax

« The XML type `ResponseBaseType` SHALL implement the requirements defined in the `ResponseBase` component. » [XDSS-4.1.11.2-1]

The `ResponseBaseType` XML element is defined in XML Schema [DSBXSD] and is provided below as a service to the reader.

```
<xs:complexType abstract="true" name="ResponseBaseType">
  <xs:sequence>
    <xs:element name="Result" type="dsb:ResultType"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="AppliedProfile"
      type="xs:anyURI"/>
  </xs:sequence>
  <xs:attribute name="RequestID" type="xs:string" use="optional"/>
  <xs:attribute name="ResponseID" type="xs:string" use="optional"/>
</xs:complexType>
```

« Each child element of `ResponseBaseType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.1.11.2-2]

4.2 Request/Response related data structures defined in this document

The XML elements of this section are defined in the XML namespace:

<http://docs.oasis-open.org/dss-x/ns/core>

4.2.1 Component InputDocuments

This element is used to send input documents to a DSS server, whether for signing or verifying. An input document can be any piece of data that can be used as input to a signature or timestamp calculation. An input document can even be a signature or timestamp (for example, a pre-existing signature can be counter-signed or timestamped). An input document can also be a `<ds:Manifest>`, allowing the client to handle manifest creation while using the server to create the rest of the signature. Manifest validation is supported by an optional input / output.

Below follows a list of the sub-components that MAY be present within this component:

The `Document` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.2.3. » [DSS-4.2.1-1]

The `TransformedData` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document. » [DSS-4.2.1-2] It contains the binary output of a chain of transforms applied by a client.

The `DocumentHash` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.2.5. » [DSS-4.2.1-3] It contains a set of digest algorithm and the corresponding hashes. Required transformation steps

4.2.1.1 InputDocuments – JSON Syntax

« The `InputDocumentsType` JSON object SHALL implement in JSON syntax the requirements defined in the `InputDocuments` component. » [JDSS-4.2.1.1-1]

« Properties of the JSON object SHALL implement the sub-components of `InputDocuments` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Document	doc
TransformedData	transformed
DocumentHash	docHash

» [JDSS-4.2.1.1-2]

The InputDocumentsType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-InputDocumentsType": {
  "type": "object",
  "properties": {
    "doc": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DocumentType"
      }
    },
    "transformed": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-TransformedDataType"
      }
    },
    "docHash": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DocumentHashType"
      }
    }
  }
}
```

4.2.1.2 InputDocuments – XML Syntax

« The XML type InputDocumentsType SHALL implement the requirements defined in the InputDocuments component. » [XDSS-4.2.1.2-1]

The InputDocumentsType XML element is defined in XML Schema [DSS2XSD] and is copied below as a service for the reader.

```
<xs:complexType name="InputDocumentsType">
  <xs:choice>
    <xs:sequence maxOccurs="unbounded">
      <xs:element name="Document" type="dss2:DocumentType"/>
    </xs:sequence>
    <xs:sequence maxOccurs="unbounded">
      <xs:element name="TransformedData" type="dss2:TransformedDataType"/>
    </xs:sequence>
    <xs:sequence maxOccurs="unbounded">
      <xs:element name="DocumentHash" type="dss2:DocumentHashType"/>
    </xs:sequence>
  </xs:choice>
</xs:complexType>
```

« Each child element of `InputDocumentsType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.1.2-2]

4.2.2 Component DocumentBase

The `DocumentBaseType` forwards its elements to the components `DocumentType`, `TransformedDataType` and `DocumentHashType`. The `DocumentBaseType` contains the basic information shared by the inheriting components and remaining persistent during the process from input document retrieval until digest calculation for the relevant document.

Below follows a list of the sub-components that MAY be present within this component:

« The optional `Id` element MUST contain one instance of a unique identifier. » [DSS-4.2.2-1]

This identifier gives the input document a unique label within a particular request message. Through this identifier, an optional input can refer to a single input document. Using this identifier and the `IdRef` element it is possible to avoid redundant content.

« The optional `RefURI` element MUST contain one instance of a URI. » [DSS-4.2.2-2] This specifies the value for a `<ds:Reference>` element's URI attribute when referring to this input document. The `RefURI` element SHOULD be specified. Not more than one `RefURI` element may be omitted in a single signing request.

« The optional `RefType` element MUST contain one instance of a URI. » [DSS-4.2.2-3] This specifies the value for a `<ds:Reference>` element's Type attribute when referring to this input document.

« The optional `SchemaRefs` element MUST contain one instance of a unique identifier reference. » [DSS-4.2.2-4] The identified schemas are to be used to process the Id attributes during parsing and for XPath evaluation. « If anything, else but Schema are referred to, the server MUST report an error. » [DSS-4.2.2-5] If a referred to Schema is not used by the XML document instance this MAY be ignored or reported to the client in the subcomponent `ResultMessage`. The Document is assumed to be valid against the first Schema referred to by `SchemaRefs`. If a Schemas element is referred to first by `SchemaRefs` the document is assumed to be valid against the first Schema inside `SchemaRefs`. In both cases, the remaining schemas may occur in any order and are used either directly or indirectly by the first schema.

« If present, the server MUST use the schemas to identify the Id attributes. » [DSS-4.2.2-6] In addition, the server MAY also perform complete validation against the schemas.

Non-normative Comment:

It is recommended to use `xml:id` as defined in [xml:id] as id in the payload being referenced by a `<ds:Reference>`, because the schema then does not have to be supplied for identifying the Id attributes.

4.2.2.1 DocumentBase – JSON Syntax

« The `DocumentBaseType` JSON object SHALL implement in JSON syntax the requirements defined in the `DocumentBase` component. » [JDSS-4.2.2.1-1]

« Properties of the JSON object SHALL implement the sub-components of `DocumentBase` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>Id</code>	<code>ID</code>
<code>RefURI</code>	<code>refURI</code>

RefType	refType
SchemaRefs	schemaRefs

» [JDSS-4.2.2.1-2]

The DocumentBaseType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-DocumentBaseType": {
  "type": "object",
  "properties": {
    "ID": {
      "type": "string"
    },
    "refURI": {
      "type": "string"
    },
    "refType": {
      "type": "string"
    },
    "schemaRefs": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DocumentType"
      }
    }
  }
}
```

4.2.2.2 DocumentBase – XML Syntax

« The XML type DocumentBaseType SHALL implement the requirements defined in the DocumentBase component. » [XDSS-4.2.2.2-1]

The DocumentBaseType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType abstract="true" name="DocumentBaseType">
  <xs:attribute name="Id" type="xs:ID" use="optional"/>
  <xs:attribute name="RefURI" type="xs:anyURI" use="optional"/>
  <xs:attribute name="RefType" type="xs:anyURI" use="optional"/>
  <xs:attribute name="SchemaRefs" type="xs:IDREFS" use="optional"/>
</xs:complexType>
```

« Each child element of DocumentBaseType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.2.2-2]

4.2.3 Component Document

The Document component contains input data for DSS processing.

Below follows a list of the sub-components that MAY be present within this component:

- « The Base64Data element MUST contain one instance of a sub-component. » [DSS-4.2.3-1]
- « This element MUST satisfy the requirements specified in this document in section 4.1.6. » [DSS-4.2.3-2]

A set of sub-components is inherited from component 4.2.2 and is not repeated here.

4.2.3.1 Document – JSON Syntax

« The `DocumentType` JSON object SHALL implement in JSON syntax the requirements defined in the `Document` component. » [JDSS-4.2.3.1-1]

« Properties of the JSON object SHALL implement the sub-components of `Document` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>Base64Data</code>	<code>b64Data</code>

» [JDSS-4.2.3.1-2]

The `DocumentType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-DocumentType": {
  "type": "object",
  "properties": {
    "Id": {
      "type": "string"
    },
    "refURI": {
      "type": "string"
    },
    "refType": {
      "type": "string"
    },
    "schemaRefs": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DocumentType"
      }
    },
    "b64Data": {
      "$ref": "#/definitions/dsb-Base64DataType"
    }
  },
  "required": ["b64Data"]
}
```

4.2.3.2 Document – XML Syntax

« The XML type `DocumentType` SHALL implement the requirements defined in the `Document` component. » [XDSS-4.2.3.2-1]

The `DocumentType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="DocumentType">
  <xs:complexContent>
    <xs:extension base="dss2:DocumentBaseType">
      <xs:sequence>
        <xs:element maxOccurs="1" minOccurs="1" name="Base64Data"
          type="dsb:Base64DataType"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

« Each child element of `DocumentType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.3.2-2]

4.2.4 Component TransformedData

Below follows a list of the sub-components that MAY be present within this component:

« The optional `Transforms` element MUST contain a sub-component. » [DSS-4.2.4-1] « A given element MUST satisfy the requirements specified in section 4.4.2. » [DSS-4.2.4-2] This is the sequence of transforms applied by the client. It specifies the value for a `<ds:Reference>` element's `<ds:Transforms>` child element. In other words, this specifies transforms that the client has already applied to the input document before the server will hash it. This component is required on a `SignRequest`, optional on a `VerifyRequest`.

« The `Base64Data` element MUST contain one instance of a sub-component. » [DSS-4.2.4-3]

« This element MUST satisfy the requirements specified in this document in section 4.1.6. » [DSS-4.2.4-4] This element gives the binary output of a sequence of transforms to be hashed at the server side.

« The optional `WhichReference` element MUST contain one instance of an integer. » [DSS-4.2.4-5] As there may be multiple `TransformedDataType` / `DocumentHashType` components of the same document having the same URI [RFC 2396] and `RefType` on a `SignRequest` or `VerifyRequest` - their correspondance to an already existing `<ds:Reference>` however needs to be established on a `VerifyRequest` only. There is a need to disambiguate such cases. This element hence offers a way to clearly identify the `<ds:Reference>` when URI and `RefType` match multiple components. The corresponding `<ds:Reference>` is indicated by this zero-based `WhichReference` element (0 means the first `<ds:Reference>` in the signature, 1 means the second, and so on). This component is ignored on a `SignRequest`, optional on a `VerifyRequest`.

A set of sub-components is inherited from component 4.2.2 and is not repeated here.

Non-normative Comment:

It may be possible to establish the `<ds:References>` / `TransformedDataType` / `DocumentHashType` correspondence by comparing the optionally supplied chain of transforms to those of the `<ds:References>` having the same URI and `RefType` in the supplied `<ds:Signature>` if this chain of transform has been supplied. This can be quite expensive and even outnumber the advantages of `TransformedDataType` / `DocumentHashType`.

4.2.4.1 TransformedData – JSON Syntax

« The `TransformedDataType` JSON object SHALL implement in JSON syntax the requirements defined in the `TransformedData` component. » [JDSS-4.2.4.1-1]

« Properties of the JSON object SHALL implement the sub-components of `TransformedData` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Transforms	<code>transforms</code>
Base64Data	<code>b64Data</code>
WhichReference	<code>whichRef</code>

» [JDSS-4.2.4.1-2]

The `TransformedDataType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.


```

"dss2-TransformedDataType": {
  "type": "object",
  "properties": {
    "Id": {
      "type": "string"
    },
    "refURI": {
      "type": "string"
    },
    "refType": {
      "type": "string"
    },
    "schemaRefs": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DocumentType"
      }
    },
    "transforms": {
      "$ref": "#/definitions/dsigrw-TransformsType"
    },
    "b64Data": {
      "$ref": "#/definitions/dsb-Base64DataType"
    },
    "whichRef": {
      "type": "integer"
    }
  },
  "required": ["b64Data"]
}

```

4.2.4.2 TransformedData – XML Syntax

« The XML type TransformedDataType SHALL implement the requirements defined in the TransformedData component. » [XDSS-4.2.4.2-1]

The TransformedDataType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="TransformedDataType">
  <xs:complexContent>
    <xs:extension base="dss2:DocumentBaseType">
      <xs:sequence>
        <xs:element minOccurs="0" name="Transforms"
          type="ds-rw:TransformsType"/>
        <xs:element name="Base64Data" type="dsb:Base64DataType"/>
      </xs:sequence>
      <xs:attribute name="WhichReference" type="xs:integer" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of TransformedDataType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.4.2-2]

4.2.5 Component DocumentHash

The `DocumentHash` component represents a document that will not be transported to the server but just the calculated digest of it. This is intended to limit the amount of data transferred or to ensure privacy of the document.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `Transforms` element MUST contain a sub-component. » [DSS-4.2.5-1] « A given element MUST satisfy the requirements specified in section 4.4.2. » [DSS-4.2.5-2] It specifies the value for a `<ds:Reference>` element's `<ds:Transforms>` child element when referring to this document hash. In other words, this specifies transforms that the client has already applied to the input document before hashing it. This component is required on a `SignRequest`, optional on a `VerifyRequest`. This component is required on a `SignRequest`, optional on a `VerifyRequest`.
- « The `DigestInfos` element MUST occur 1 or more times containing a sub-component. » [DSS-4.2.5-3] « Each instance MUST satisfy the requirements specified in this document in section 4.1.4. » [DSS-4.2.5-4] This element MAY contain more than one `DigestInfo` sub-component to represent the digest values calculated with different digest algorithms. This may be useful when a requestor doesn't know upfront which digest algorithms are supported / accepted by the server for signing. In the case of a verification request the client may not be able to parse the signature and instead calculate the digest for a comprehensive set of digest algorithms.
- « The optional `WhichReference` element MUST contain one instance of an integer. » [DSS-4.2.5-5] As there may be multiple `TransformedDataType` / `DocumentHashType` components of the same document having the same URI [RFC 2396] and `RefType` on a `SignRequest` or `VerifyRequest` - their correspondence to an already existing `<ds:Reference>` however needs to be established on a `VerifyRequest` only. There is a need to disambiguate such cases. This element hence offers a way to clearly identify the `<ds:Reference>` when URI and `RefType` match multiple components. The corresponding `<ds:Reference>` is indicated by this zero-based `WhichReference` element (0 means the first `<ds:Reference>` in the signature, 1 means the second, and so on).

A set of sub-components is inherited from component 4.2.2 and is not repeated here.

4.2.5.1 DocumentHash – JSON Syntax

« The `DocumentHashType` JSON object SHALL implement in JSON syntax the requirements defined in the `DocumentHash` component. » [JDSS-4.2.5.1-1]

« Properties of the JSON object SHALL implement the sub-components of `DocumentHash` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Transforms	<code>transforms</code>
DigestInfos	<code>di</code>
WhichReference	<code>whichRef</code>

» [JDSS-4.2.5.1-2]

The `DocumentHashType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-DocumentHashType": {
  "type": "object",
  "properties": {
    "Id": {
      "type": "string"
    },
    "refURI": {
      "type": "string"
    },
    "refType": {
      "type": "string"
    },
    "schemaRefs": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DocumentType"
      }
    },
    "transforms": {
      "$ref": "#/definitions/dsigrw-TransformsType"
    },
    "di": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-DigestInfoType"
      }
    },
    "whichRef": {
      "type": "integer"
    }
  },
  "required": ["di"]
}

```

4.2.5.2 DocumentHash – XML Syntax

« The XML type DocumentHashType SHALL implement the requirements defined in the DocumentHash component. » [XDSS-4.2.5.2-1]

The DocumentHashType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="DocumentHashType">
  <xs:complexContent>
    <xs:extension base="dss2:DocumentBaseType">
      <xs:sequence>
        <xs:element minOccurs="0" name="Transforms"
          type="ds-rw:TransformsType"/>
        <xs:element maxOccurs="unbounded" minOccurs="1" name="DigestInfos"
          type="dsb:DigestInfoType"/>
      </xs:sequence>
      <xs:attribute name="WhichReference" type="xs:integer" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of DocumentHashType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [JDSS-4.2.5.2-2]

4.2.6 Component SignRequest

The `SignRequest` component is sent by the client to request a signature or timestamp on some input documents.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `InputDocuments` element MUST contain a sub-component. » [DSS-4.2.6-1]
- « A given element MUST satisfy the requirements specified in this document in section 4.2.1. » [DSS-4.2.6-2]
- « The optional `OptionalInputs` element MUST contain a sub-component. » [DSS-4.2.6-3]
- « A given element MUST satisfy the requirements specified in this document in section 4.3.4. » [DSS-4.2.6-4] It is intended to transport additional input elements of the signing request.

A set of sub-components is inherited from component 4.1.10 and is not repeated here.

4.2.6.1 SignRequest – JSON Syntax

« The `SignRequestType` JSON object SHALL implement in JSON syntax the requirements defined in the `SignRequest` component. » [JDSS-4.2.6.1-1]

« Properties of the JSON object SHALL implement the sub-components of `SignRequest` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>InputDocuments</code>	<code>inDocs</code>
<code>OptionalInputs</code>	<code>optInp</code>

» [JDSS-4.2.6.1-2]

The `SignRequestType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-SignRequestType": {
  "type": "object",
  "properties": {
    "profile": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "reqID": {
      "type": "string"
    },
    "inDocs": {
      "$ref": "#/definitions/dss2-InputDocumentsType"
    },
    "optInp": {
      "$ref": "#/definitions/dss2-OptionalInputsSignType"
    }
  }
}
```

4.2.6.2 SignRequest – XML Syntax

« The XML type `SignRequestType` SHALL implement the requirements defined in the `SignRequest` component. » [XDSS-4.2.6.2-1]

The `SignRequestType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="SignRequestType">
  <xs:complexContent>
    <xs:extension base="dsb:RequestBaseType">
      <xs:sequence>
        <xs:element minOccurs="0" name="InputDocuments"
          type="dss2:InputDocumentsType"/>
        <xs:element minOccurs="0" name="OptionalInputs"
          type="dss2:OptionalInputsSignType"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

« Each child element of `SignRequestType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.6.2-2]

4.2.7 Component SignResponse

The `SignResponse` component returns the requested signature or timestamp to the requestor.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `OptionalOutputs` element MUST contain a sub-component. » [DSS-4.2.7-1]
- « A given element MUST satisfy the requirements specified in this document in section 4.3.7. » [DSS-4.2.7-2] The `OptionalOutputs` element contains additional signing related outputs returned by the server.
- « The optional `SignatureObject` element MUST contain a sub-component. » [DSS-4.2.7-3]
- « A given element MUST satisfy the requirements specified in this document in section 4.2.8. » [DSS-4.2.7-4]

A set of sub-components is inherited from component 4.1.11 and is not repeated here.

4.2.7.1 SignResponse – JSON Syntax

« The `SignResponseType` JSON object SHALL implement in JSON syntax the requirements defined in the `SignResponse` component. » [JDSS-4.2.7.1-1]

« Properties of the JSON object SHALL implement the sub-components of `SignResponse` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>OptionalOutputs</code>	<code>optOutp</code>
<code>SignatureObject</code>	<code>sigObj</code>

» [JDSS-4.2.7.1-2]

The `SignResponseType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-SignResponseType": {
  "type": "object",
  "properties": {
    "result": {
      "$ref": "#/definitions/dsb-ResultType"
    },
    "profile": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "reqID": {
      "type": "string"
    },
    "respID": {
      "type": "string"
    },
    "optOutp": {
      "$ref": "#/definitions/dss2-OptionalOutputsSignType"
    },
    "sigObj": {
      "$ref": "#/definitions/dss2-SignatureObjectType"
    }
  }
}

```

4.2.7.2 SignResponse – XML Syntax

« The XML type SignResponseType SHALL implement the requirements defined in the SignResponse component. » [XDSS-4.2.7.2-1]

The SignResponseType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="SignResponseType">
  <xs:complexContent>
    <xs:extension base="dsb:ResponseBaseType">
      <xs:sequence>
        <xs:element minOccurs="0" name="OptionalOutputs"
          type="dss2:OptionalOutputsSignType"/>
        <xs:element minOccurs="0" name="SignatureObject"
          type="dss2:SignatureObjectType"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of SignResponseType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.7.2-2]

4.2.8 Component SignatureObject

The SignatureObject component contains a signature or timestamp of some sort. This element is returned in a sign response message and sent in a verify request message.

Below follows a list of the sub-components that MAY be present within this component:

« The optional `Base64Signature` element MUST contain one instance of a sub-component. » [DSS-4.2.8-1] « This element MUST satisfy the requirements specified in this document in section 4.1.6. » [DSS-4.2.8-2] A base64 encoding of some arbitrary signature, such as an XML signature [XMLDSIG], PGP [RFC 2440] or CMS [RFC 5652] signature or a RFC 3161 timestamp [RFC 3161]. The type of signature is specified by the `MimeType` element of the `Base64DataType` component. Profiles MAY define the handling of additional types.

« The optional `SignaturePtr` element MUST contain one instance of a sub-component. » [DSS-4.2.8-3] « This element MUST satisfy the requirements specified in this document in section 4.2.9. » [DSS-4.2.8-4] This element is used to point to an XML signature in an input (for a verify request) or output (for a sign response) document in which a signature is enveloped.

« The optional `SchemaRefs` element MUST contain one instance of a unique identifier reference. » [DSS-4.2.8-5] The identified schemas are to be used to process the `Id` attributes during parsing and for XPath evaluation. If anything, else but `<Schema>` are referred to, the server MUST report an error. If a referred to `<Schema>` is not used by the XML document instance this MAY be ignored or reported to the client in the 4.1.7 [Component Result](#) subcomponent `ResultMessage`.

4.2.8.1 SignatureObject – JSON Syntax

« The `SignatureObjectType` JSON object SHALL implement in JSON syntax the requirements defined in the `SignatureObject` component. » [JDSS-4.2.8.1-1]

« Properties of the JSON object SHALL implement the sub-components of `SignatureObject` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Base64Signature	<code>b64Sig</code>
SignaturePtr	<code>sigPtr</code>
SchemaRefs	<code>schemaRefs</code>

» [JDSS-4.2.8.1-2]

The `SignatureObjectType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-SignatureObjectType": {
  "type": "object",
  "properties": {
    "b64Sig": {
      "$ref": "#/definitions/dsb-Base64DataType"
    },
    "sigPtr": {
      "$ref": "#/definitions/dss2-SignaturePtrType"
    },
    "schemaRefs": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DocumentBaseType"
      }
    }
  },
  "minProperties": 1
}

```

4.2.8.2 SignatureObject – XML Syntax

« The XML type SignatureObjectType SHALL implement the requirements defined in the SignatureObject component. » [XDSS-4.2.8.2-1]

The SignatureObjectType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="SignatureObjectType">
  <xs:choice>
    <xs:element name="Base64Signature" type="dsb:Base64DataType"/>
    <xs:element name="SignaturePtr" type="dss2:SignaturePtrType"/>
  </xs:choice>
  <xs:attribute name="SchemaRefs" type="xs:IDREFS" use="optional"/>
</xs:complexType>

```

« Each child element of SignatureObjectType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.8.2-2]

4.2.9 Component SignaturePtr

Non-normative Comment:

The abbreviation Pointer (Ptr) has been kept to ease migration of version 1.0 service implementations.

The SignaturePtr component is used to point to a signature in an input (for a verify request) or output (for a sign response) document in which a signature is enveloped.

Below follows a list of the sub-components that MAY be present within this component:

The optional NsPrefixMapping element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.1.1. » [DSS-4.2.9-1]

« The WhichDocument element MUST contain one instance of a unique identifier reference. » [DSS-4.2.9-2] This element identifies the input document being pointed at.

« The optional `XPath` element MUST contain one instance of a string. » [DSS-4.2.9-3] This element identifies the signature element being pointed at within the selected document. The XPath expression is evaluated from the root node (see section 5.1 of [XPATH]) of the document identified by `WhichDocument`. The context node for the XPath evaluation is the document's `DocumentElement` (see section 2.1 Well-Formed XML Documents [XML]). Regarding namespace declarations for the expression necessary for evaluation see section 1 of [XPATH].

4.2.9.1 SignaturePtr – JSON Syntax

« The `SignaturePtrType` JSON object SHALL implement in JSON syntax the requirements defined in the `SignaturePtr` component. » [JDSS-4.2.9.1-1]

« Properties of the JSON object SHALL implement the sub-components of `SignaturePtr` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
NsPrefixMapping	<code>nsDecl</code>
WhichDocument	<code>whichDoc</code>
XPath	<code>xPath</code>

» [JDSS-4.2.9.1-2]

The `SignaturePtrType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-SignaturePtrType": {
  "type": "object",
  "properties": {
    "xpath": {
      "type": "string"
    },
    "nsDecl": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-NsPrefixMappingType"
      }
    },
    "whichDoc": {
      "$ref": "#/definitions/dss2-DocumentBaseType"
    },
    "XPath": {
      "type": "string"
    }
  },
  "required": ["whichDoc"]
}
```

4.2.9.2 SignaturePtr – XML Syntax

« The XML type `SignaturePtrType` SHALL implement the requirements defined in the `SignaturePtr` component. » [XDSS-4.2.9.2-1]

The `SignaturePtrType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="SignaturePtrType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="NsPrefixMapping"
      type="dsb:NsPrefixMappingType"/>
  </xs:sequence>
  <xs:attribute name="WhichDocument" type="xs:IDREF" use="required"/>
  <xs:attribute name="XPath" type="xs:string" use="optional"/>
</xs:complexType>

```

« Each child element of `SignaturePtrType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.9.2-2]

4.2.10 Component `VerifyRequest`

The `VerifyRequest` component is sent by the client to verify a signature or timestamp on some input documents.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `InputDocuments` element MUST contain a sub-component. » [DSS-4.2.10-1]
 - « A given element MUST satisfy the requirements specified in this document in section 4.2.1. » [DSS-4.2.10-2]
 - « The optional `OptionalInputs` element MUST contain a sub-component. » [DSS-4.2.10-3]
 - « A given element MUST satisfy the requirements specified in this document in section 4.3.5. » [DSS-4.2.10-4]
 - « The optional `SignatureObject` element MUST contain a sub-component. » [DSS-4.2.10-5]
 - « A given element MUST satisfy the requirements specified in this document in section 4.2.8. » [DSS-4.2.10-6]
- The `SignatureObject` element contains a signature or timestamp, or else contains a `<SignaturePtr>` that points to an XML signature in one of the input documents.

A set of sub-components is inherited from component 4.1.10 and is not repeated here.

4.2.10.1 `VerifyRequest` – JSON Syntax

« The `VerifyRequestType` JSON object SHALL implement in JSON syntax the requirements defined in the `VerifyRequest` component. » [JDSS-4.2.10.1-1]

« Properties of the JSON object SHALL implement the sub-components of `VerifyRequest` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>InputDocuments</code>	<code>inDocs</code>
<code>OptionalInputs</code>	<code>optInp</code>
<code>SignatureObject</code>	<code>sigObj</code>

» [JDSS-4.2.10.1-2]

The `VerifyRequestType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-VerifyRequestType": {
  "type": "object",
  "properties": {
    "profile": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "reqID": {
      "type": "string"
    },
    "inDocs": {
      "$ref": "#/definitions/dss2-InputDocumentsType"
    },
    "optInp": {
      "$ref": "#/definitions/dss2-OptionalInputsVerifyType"
    },
    "sigObj": {
      "$ref": "#/definitions/dss2-SignatureObjectType"
    }
  }
}

```

4.2.10.2 VerifyRequest – XML Syntax

« The XML type `VerifyRequestType` SHALL implement the requirements defined in the `VerifyRequest` component. » [XDSS-4.2.10.2-1]

The `VerifyRequestType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="VerifyRequestType">
  <xs:complexContent>
    <xs:extension base="dsb:RequestBaseType">
      <xs:sequence>
        <xs:element minOccurs="0" name="InputDocuments"
          type="dss2:InputDocumentsType"/>
        <xs:element minOccurs="0" name="OptionalInputs"
          type="dss2:OptionalInputsVerifyType"/>
        <xs:element minOccurs="0" name="SignatureObject"
          type="dss2:SignatureObjectType"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of `VerifyRequestType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.10-2]

4.2.11 Component VerifyResponse

The `VerifyResponse` component is returned by the server to provide the results of verification.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `OptionalOutputs` element MUST contain a sub-component. » [DSS-4.2.11-1]
- « A given element MUST satisfy the requirements specified in this document in section 4.3.8. » [DSS-4.2.11-2]

A set of sub-components is inherited from component 4.1.11 and is not repeated here.

4.2.11.1 VerifyResponse – JSON Syntax

« The `VerifyResponseType` JSON object SHALL implement in JSON syntax the requirements defined in the `VerifyResponse` component. » [JDSS-4.2.11.1-1]

« Properties of the JSON object SHALL implement the sub-components of `VerifyResponse` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>OptionalOutputs</code>	<code>optOutp</code>

» [JDSS-4.2.11.1-2]

The `VerifyResponseType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-VerifyResponseType": {
  "type": "object",
  "properties": {
    "result": {
      "$ref": "#/definitions/dsb-ResultType"
    },
    "profile": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "reqID": {
      "type": "string"
    },
    "respID": {
      "type": "string"
    },
    "optOutp": {
      "$ref": "#/definitions/dss2-OptionalOutputsVerifyType"
    }
  }
}
```

4.2.11.2 VerifyResponse – XML Syntax

« The XML type `VerifyResponseType` SHALL implement the requirements defined in the `VerifyResponse` component. » [XDSS-4.2.11.2-1]

The `VerifyResponseType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="VerifyResponseType">
  <xs:complexContent>
    <xs:extension base="dsb:ResponseBaseType">
      <xs:sequence>
        <xs:element minOccurs="0" name="OptionalOutputs"
          type="dss2:OptionalOutputsVerifyType"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of `VerifyResponseType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.11.2-2]

4.2.12 Component PendingRequest

The `PendingRequest` component is sent by the client to retrieve the result of a previous request.

« The client MUST provide the `ResponseID` received with the initial response. » [DSS-4.2.12-1]

« The `Profile` element MUST NOT be present as the profile selection was done with the initial request. » [DSS-4.2.12-2]

Below follows a list of the sub-components that MAY be present within this component:

« The optional `ClaimedIdentity` element MUST contain a sub-component. » [DSS-4.2.12-3]

« A given element MUST satisfy the requirements specified in this document in section 4.3.9. » [DSS-4.2.12-4] This element allows the authentication of the requestor.

A set of sub-components is inherited from component 4.1.10 and is not repeated here.

4.2.12.1 PendingRequest – JSON Syntax

« The `PendingRequestType` JSON object SHALL implement in JSON syntax the requirements defined in the `PendingRequest` component. » [JDSS-4.2.12.1-1]

« Properties of the JSON object SHALL implement the sub-components of `PendingRequest` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>ClaimedIdentity</code>	<code>claimedIdentity</code>

» [JDSS-4.2.12.1-2]

The `PendingRequestType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-PendingRequestType": {
  "type": "object",
  "properties": {
    "profile": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "reqID": {
      "type": "string"
    },
    "claimedIdentity": {
      "$ref": "#/definitions/dss2-ClaimedIdentityType"
    }
  }
}

```

4.2.12.2 PendingRequest – XML Syntax

« The XML type `PendingRequestType` SHALL implement the requirements defined in the `PendingRequest` component. » [XDSS-4.2.12.2-1]

The `PendingRequestType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="PendingRequestType">
  <xs:complexContent>
    <xs:extension base="dsb:RequestBaseType">
      <xs:sequence>
        <xs:element maxOccurs="1" minOccurs="0" name="ClaimedIdentity"
          type="dss2:ClaimedIdentityType"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of `PendingRequestType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.2.12.2-2]

4.3 Optional data structures defined in this document

The XML elements of this section are defined in the XML namespace:

<http://docs.oasis-open.org/dss-x/ns/core>

4.3.1 Component RequestID

Below follows a list of the sub-components that MAY be present within this component:

|| « The `value` element MUST contain one instance of a string. » [DSS-4.3.1-1]

4.3.1.1 RequestID – JSON Syntax

The component `RequestID` is derived from the string type.

4.3.1.2 RequestID – XML Syntax

« The XML type `RequestID` SHALL implement the requirements defined in the `RequestID` component. » [XDSS-4.3.1.2-1]

The `RequestID` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:simpleType name="RequestID">
  <xs:restriction base="xs:string"/>
</xs:simpleType>
```

« Each child element of `RequestID` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.1.2-2]

4.3.2 Component ResponseID

Below follows a list of the sub-components that MAY be present within this component:

« The `value` element MUST contain one instance of a string. » [DSS-4.3.2-1]

4.3.2.1 ResponseID – JSON Syntax

The component `ResponseID` is derived from the string type.

4.3.2.2 ResponseID – XML Syntax

« The XML type `ResponseID` SHALL implement the requirements defined in the `ResponseID` component.

» [XDSS-4.3.2.2-1]

The `ResponseID` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:simpleType name="ResponseID">
  <xs:restriction base="xs:string"/>
</xs:simpleType>
```

« Each child element of `ResponseID` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.2.2-2]

4.3.3 Component OptionalInputsBase

Non-normative Comment:

Note, that the prescribed font family renders a lowercase letter L and an uppercase letter I nearly the same. So, for clarity it is stated here, that the component described in this section is the combination of the three words Optional, Inputs and Base.

The `OptionalInputsBase` contains a common set of additional inputs associated with the processing of the request. Profiles will specify the allowed optional inputs and their default values. « If a server doesn't recognize or can't handle any optional input, it MUST reject the request with a `ResultMajor` code of `RequesterError` and a `ResultMinor` code of `NotSupported`. » [DSS-4.3.3-1]

All request messages can contain an `OptionalInputSign` or `OptionalInputVerify` element depending on the method called. The `OptionalInputsBase` component defines the elements that are common to all optional inputs defined in this document. Several optional inputs are defined in this document, and profiles can define additional ones.

Below follows a list of the sub-components that MAY be present within this component:

« The optional `ClaimedIdentity` element MUST contain a sub-component. » [DSS-4.3.3-2]

« A given element MUST satisfy the requirements specified in this document in section 4.3.9. » [DSS-4.3.3-3] This element indicates the identity of the client who is making a request. The server may use this to parameterize any aspect of its processing. « Profiles that make use of this element MUST define its semantics. » [DSS-4.3.3-4]

« The optional `Schemas` element MUST contain a sub-component. » [DSS-4.3.3-5] « A given element MUST satisfy the requirements specified in this document in section 4.3.10. » [DSS-4.3.3-6] The `Schemas` element provides a mechanism for transporting XML schemas required for validating an XML document along with the request message.

« The optional `AddTimestamp` element MUST contain a sub-component. » [DSS-4.3.3-7] « A given element MUST satisfy the requirements specified in this document in section 4.3.11. » [DSS-4.3.3-8] The `AddTimestamp` element indicates that the client wishes the server to embed a timestamp token as a property or attribute of the resultant or the supplied signature. The timestamp token will be applied to the signature value in the case of CMS/PKCS7 signatures or the `<ds:SignatureValue>` element in the case of XML signatures. Note: Procedures for handling other forms of timestamp may be defined in profiles of the Core. In particular, the DSS AdES profile [DSS-AdES-P] defines procedures for generating timestamps over the content which is about to be signed (sometimes called content timestamps), and the DSS Timestamp profile [DSS-TS-P] defines procedures for handling standalone timestamps.

A set of sub-components is inherited from component 4.1.8 and is not repeated here.

4.3.3.1 OptionalInputsBase – JSON Syntax

The component `OptionalInputsBase` is abstract and therefore has no JSON definition.

4.3.3.2 OptionalInputsBase – XML Syntax

« The XML type `OptionalInputsBaseType` SHALL implement the requirements defined in the `OptionalInputsBase` component. » [XDSS-4.3.3.2-1]

The `OptionalInputsBaseType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType abstract="true" name="OptionalInputsBaseType">
  <xs:complexContent>
    <xs:extension base="dsb:OptionalInputsType">
      <xs:sequence>
        <xs:choice>
          <xs:element maxOccurs="1" minOccurs="0" name="ClaimedIdentity"
            type="dss2:ClaimedIdentityType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="Schemas"
            type="dss2:SchemasType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="AddTimestamp"
            type="dss2:AugmentSignatureInstructionType"/>
        </xs:choice>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

« Each child element of `OptionalInputsBaseType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.3.2-2]

4.3.4 Component OptionalInputsSign

Non-normative Comment:

Note, that the prescribed font family renders a lowercase letter L and an uppercase letter I nearly the same. So, for clarity it is stated here, that the component described in this section is the combination of the three words Optional, Inputs and Sign.

The OptionalInputsSign component defines a set of additional inputs associated with the processing of a signing request. The OptionalInputsSign component contains additional inputs associated with the processing of a signing request. Profiles MAY specify the allowed optional inputs and their default values. The definition of an optional input MAY include a default value, so that a client may omit the OptionalInputsSign yet still get service from any profile-compliant DSS server. « If a server doesn't recognize or can't handle any optional input, it MUST reject the request with a ResultMajor code of RequesterError and a ResultMinor code of NotSupported.» [DSS-4.3.4-1]

Below follows a list of the sub-components that MAY be present within this component:

« The optional SignatureType element MUST contain a URI. » [DSS-4.3.4-2] The SignatureType element indicates the type of signature or timestamp to produce (such as an XML signature, an XML timestamp, a RFC 3161 timestamp, a CMS signature, etc.). See section 7.1 for some URI references that MAY be used as the value of this element.

« The optional IntendedAudience element MUST contain a sub-component. » [DSS-4.3.4-3]

« A given element MUST satisfy the requirements specified in this document in section 4.3.12. » [DSS-4.3.4-4] This element gives a hint regarding the target audience of the requested signature.

The optional KeySelector element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.13. » [DSS-4.3.4-5] The KeySelector provides details which key or sets of keys the client is expecting to be used.

« The optional Properties element MUST contain a sub-component. » [DSS-4.3.4-6] « A given element MUST satisfy the requirements specified in this document in section 4.3.15. » [DSS-4.3.4-7] The Properties element is used to instruct the server to add certain signed or unsigned properties (aka "signature attributes") into the signature. The client MAY send the server a particular value to use for each property or leave the value up to the server to determine. The server MAY add additional properties, even if these aren't requested by the client.

The optional IncludeObject element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.18. » [DSS-4.3.4-8] The IncludeObject element is used to request the creation of an XMLSig enveloping signature.

« The optional IncludeEContent element MUST contain a boolean. » [DSS-4.3.4-9] Its default value is 'false'. If the value of the IncludeEContent is 'true' a CMS signature includes enveloped (or 'encapsulated') content.

« The optional SignaturePlacement element MUST contain a sub-component. » [DSS-4.3.4-10] « A given element MUST satisfy the requirements specified in this document in section 4.3.19. » [DSS-4.3.4-11] The SignaturePlacement element is used to request the creation of an XMLSig enveloped signature placed within a document. The resulting document with the enveloped signature is placed in the optional output DocumentWithSignature.

« The optional `SignedReferences` element MUST contain a sub-component. » [DSS-4.3.4-12] « A given element MUST satisfy the requirements specified in this document in section 4.3.21. » [DSS-4.3.4-13] The `SignedReferences` element gives the client greater control over how the `<ds:Reference>` elements of a XMLSig signature are formed.

« The optional `Nonce` element MUST contain an integer. » [DSS-4.3.4-14] The `Nonce` element MAY be used to provide a large random number to enable the client correlate a timestamp request with the response.

« The optional `SignatureAlgorithm` element MUST contain a string. » [DSS-4.3.4-15] The `SignatureAlgorithm` element MAY be used to request a specific signing algorithm. This may be useful to narrow down the limit the set of algorithms the server may use. Support for specific signature algorithms may change over time and the use of other input elements, specially `Profile` and `ServicePolicy`. The of the `SignatureAlgorithm` value is context specific, maybe different when requesting a CMS or XML signature.

« The optional `SignatureQualityLevel` element MUST contain a URI. » [DSS-4.3.4-16] Legal and regulatory frameworks distinguish signatures by their level of quality, where a higher level of quality usually implies stronger restrictions on holder identification, protection of private key and certification of signature creation device and software. A server MAY be able to generate signatures of different quality levels. This element allows the requester to define a minimum signature quality level. Values for this URI may be specified by profiles.

A set of sub-components is inherited from component 4.3.3 and is not repeated here.

4.3.4.1 OptionalInputsSign – JSON Syntax

« The `OptionalInputsSignType` JSON object SHALL implement in JSON syntax the requirements defined in the `OptionalInputsSign` component. » [JDSS-4.3.4.1-1]

« Properties of the JSON object SHALL implement the sub-components of `OptionalInputsSign` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>SignatureType</code>	<code>sigType</code>
<code>IntendedAudience</code>	<code>aud</code>
<code>KeySelector</code>	<code>keySel</code>
<code>Properties</code>	<code>props</code>
<code>IncludeObject</code>	<code>incObj</code>
<code>IncludeEContent</code>	<code>incContent</code>
<code>SignaturePlacement</code>	<code>sigPlacement</code>
<code>SignedReferences</code>	<code>sigRefs</code>
<code>Nonce</code>	<code>nonce</code>
<code>SignatureAlgorithm</code>	<code>sigAlgo</code>
<code>SignatureQualityLevel</code>	<code>quality</code>

» [JDSS-4.3.4.1-2]

The `OptionalInputsSignType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-OptionalInputsSignType": {
  "type": "object",
  "properties": {
    "policy": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "lang": {
      "type": "string"
    },
    "other": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-AnyType"
      }
    },
    "claimedIdentity": {
      "$ref": "#/definitions/dss2-ClaimedIdentityType"
    },
    "schemas": {
      "$ref": "#/definitions/dss2-SchemasType"
    },
    "addTimestamp": {
      "$ref": "#/definitions/dss2-AugmentSignatureInstructionType"
    },
    "sigType": {
      "type": "string"
    },
    "aud": {
      "$ref": "#/definitions/dss2-IntendedAudienceType"
    },
    "keySel": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-KeySelectorType"
      }
    },
    "props": {
      "$ref": "#/definitions/dss2-PropertiesHolderType"
    },
    "incObj": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-IncludeObjectType"
      }
    },
    "incContent": {
      "type": "boolean",
      "default": "false"
    },
    "sigPlacement": {
      "$ref": "#/definitions/dss2-SignaturePlacementType"
    },
    "sigRefs": {
```

```

    "$ref": "#/definitions/dss2-SignedReferencesType"
  },
  "nonce": {
    "type": "integer"
  },
  "sigAlgo": {
    "type": "string"
  },
  "quality": {
    "type": "string"
  }
}
}

```

4.3.4.2 OptionalInputsSign – XML Syntax

« The XML type `OptionalInputsSignType` SHALL implement the requirements defined in the `OptionalInputsSign` component. » [XDSS-4.3.4.2-1]

The `OptionalInputsSignType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="OptionalInputsSignType">
  <xs:complexContent>
    <xs:extension base="dss2:OptionalInputsBaseType">
      <xs:sequence>
        <xs:choice>
          <xs:element maxOccurs="1" minOccurs="0" name="SignatureType"
            type="xs:anyURI"/>
          <xs:element maxOccurs="1" minOccurs="0" name="IntendedAudience"
            type="dss2:IntendedAudienceType"/>
          <xs:element maxOccurs="unbounded" minOccurs="0" name="KeySelector"
            type="dss2:KeySelectorType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="Properties"
            type="dss2:PropertiesHolderType"/>
          <xs:element maxOccurs="unbounded" minOccurs="0" name="IncludeObject"
            type="dss2:IncludeObjectType"/>
          <xs:element default="false" maxOccurs="1" minOccurs="0"
            name="IncludeEContent" type="xs:boolean"/>
          <xs:element maxOccurs="1" minOccurs="0" name="SignaturePlacement"
            type="dss2:SignaturePlacementType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="SignedReferences"
            type="dss2:SignedReferencesType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="Nonce"
            type="xs:integer"/>
          <xs:element maxOccurs="1" minOccurs="0" name="SignatureAlgorithm"
            type="xs:string"/>
          <xs:element maxOccurs="1" minOccurs="0" name="SignatureQualityLevel"
            type="xs:anyURI"/>
        </xs:choice>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of `OptionalInputsSignType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.4.2-2]

4.3.5 Component OptionalInputsVerify

Note, that the prescribed font family renders a lowercase letter l and an uppercase letter i nearly the same. So, for clarity it is stated here, that the component described in this section is the combination of the three words Optional, Inputs and Verify.

The `OptionalInputsVerify` component defines a set of additional inputs associated with the processing of a verification request. Profiles MAY specify the allowed optional inputs and their default values. The definition of an optional input MAY include a default value, so that a client may omit the `OptionalInputsVerify` yet still get service from any profile-compliant DSS server. « If a server doesn't recognize or can't handle any optional input, the server MUST reject the request with a `ResultMajor` code of `RequesterError` and a `ResultMinor` code of `NotSupported`. » [DSS-4.3.5-1]

Below follows a list of the sub-components that MAY be present within this component:

« The optional `UseVerificationTime` element MUST contain a sub-component. » [DSS-4.3.5-2] « A given element MUST satisfy the requirements specified in this document. » [DSS-4.3.5-3] The `UseVerificationTime` element instructs the server to attempt to determine the signature's validity at the specified time, instead of a time determined by the server policy.

« The optional `ReturnVerificationTimeInfo` element MUST contain a boolean. » [DSS-4.3.5-4] Its default value is 'false'. This element can be used by the client to obtain the time instant used by the server to validate the signature.

The optional `AdditionalKeyInfo` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.28. » [DSS-4.3.5-5] This element provides the server with additional data (such as certificates and CRLs) which it can use to validate the signature. These options are not allowed in multi-signature verification.

« The optional `ReturnProcessingDetails` element MUST contain a boolean. » [DSS-4.3.5-6] Its default value is 'false'. This element instructs the server to return a `ProcessingDetails` element. It is not allowed in multi-signature verification.

« The optional `ReturnSigningTimeInfo` element MUST contain a boolean. » [DSS-4.3.5-7] Its default value is 'false'. This element allows the client to instruct the server to return the time instant associated to the signature creation as a `SigningTimeInfo` element.

« The optional `ReturnSignerIdentity` element MUST contain a boolean. » [DSS-4.3.5-8] Its default value is 'false'.

The optional `ReturnAugmentedSignature` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.11. » [DSS-4.3.5-9] This element allows the client to instruct the server to return an `Component AugmentedSignature` output, containing an augmented signature. This document does not define values for this element, but profiles may provide a set of URIs.

The optional `ReturnTransformedDocument` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.33. » [DSS-4.3.5-10] The `ReturnTransformedDocument` element instructs the server to return an input document to which the XML signature transforms specified by a particular `<ds:Reference>` have been applied. The result of the transformations will be returned as a `TransformedDocument` element.

« The optional `ReturnTimestampedSignature` element MUST contain a sub-component. » [DSS-4.3.5-11] « A given element MUST satisfy the requirements specified in this document in section 4.3.11. » [DSS-4.3.5-12] It indicates that the client wishes the server to update the signature after its verification by embedding a signature timestamp token as an unauthenticated attribute (see "unauthAttrs" in section 9.1 [RFC 3852]) or *unsigned* property (see section 6.2.5 "The UnsignedSignatureProperties element" and section 7.3 "The SignatureTimeStamp element" [XAdES]) of the supplied signature. The timestamp token will be on the signature value in the case of CMS/PKCS7 signatures or the <ds:SignatureValue> element in the case of XML signatures.

« The optional `VerifyManifests` element MUST contain a boolean. » [DSS-4.3.5-13] Its default value is 'false'. This element is allowed in multi-signature verification requests.

A set of sub-components is inherited from component 4.3.3 and is not repeated here.

4.3.5.1 OptionalInputsVerify – JSON Syntax

« The `OptionalInputsVerifyType` JSON object SHALL implement in JSON syntax the requirements defined in the `OptionalInputsVerify` component. » [JDSS-4.3.5.1-1]

« Properties of the JSON object SHALL implement the sub-components of `OptionalInputsVerify` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>UseVerificationTime</code>	<code>useVerificationTime</code>
<code>ReturnVerificationTimeInfo</code>	<code>returnVerificationTime</code>
<code>AdditionalKeyInfo</code>	<code>addKeyInfo</code>
<code>ReturnProcessingDetails</code>	<code>returnProcDetails</code>
<code>ReturnSigningTimeInfo</code>	<code>returnSigningTime</code>
<code>ReturnSignerIdentity</code>	<code>returnSigner</code>
<code>ReturnAugmentedSignature</code>	<code>returnAugmented</code>
<code>ReturnTransformedDocument</code>	<code>returnTransformed</code>
<code>ReturnTimestampedSignature</code>	<code>returnTimestamped</code>
<code>VerifyManifests</code>	<code>verifyManifests</code>

» [JDSS-4.3.5.1-2]

The `OptionalInputsVerifyType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-OptionalInputsVerifyType": {
  "type": "object",
  "properties": {
    "policy": {
      "type": "array",
      "items": {
        "type": "string"
      }
    }
  }
}
```

```

    },
    "lang": {
      "type": "string"
    },
    "other": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-AnyType"
      }
    },
    "claimedIdentity": {
      "$ref": "#/definitions/dss2-ClaimedIdentityType"
    },
    "schemas": {
      "$ref": "#/definitions/dss2-SchemasType"
    },
    "addTimestamp": {
      "$ref": "#/definitions/dss2-AugmentSignatureInstructionType"
    },
    "useVerificationTime": {
      "$ref": "#/definitions/dss2-UseVerificationTimeType"
    },
    "returnVerificationTime": {
      "type": "boolean",
      "default": "false"
    },
    "addKeyInfo": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-AdditionalKeyInfoType"
      }
    },
    "returnProcDetails": {
      "type": "boolean",
      "default": "false"
    },
    "returnSigningTime": {
      "type": "boolean",
      "default": "false"
    },
    "returnSigner": {
      "type": "boolean",
      "default": "false"
    },
    "returnAugmented": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-AugmentSignatureInstructionType"
      }
    },
    "returnTransformed": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-ReturnTransformedDocumentType"
      }
    },
    "returnTimestamped": {
      "$ref": "#/definitions/dss2-AugmentSignatureInstructionType"
    },
    "verifyManifests": {

```

```

    "type": "boolean",
    "default": "false"
  }
}
}

```

4.3.5.2 OptionalInputsVerify – XML Syntax

« The XML type `OptionalInputsVerifyType` SHALL implement the requirements defined in the `OptionalInputsVerify` component. » [XDSS-4.3.5.2-1]

The `OptionalInputsVerifyType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="OptionalInputsVerifyType">
  <xs:complexContent>
    <xs:extension base="dss2:OptionalInputsBaseType">
      <xs:sequence>
        <xs:choice>
          <xs:element maxOccurs="1" minOccurs="0" name="UseVerificationTime"
            type="dss2:UseVerificationTimeType"/>
          <xs:element default="false" maxOccurs="1" minOccurs="0"
            name="ReturnVerificationTimeInfo" type="xs:boolean"/>
          <xs:element maxOccurs="unbounded" minOccurs="0"
            name="AdditionalKeyInfo"
            type="dss2:AdditionalKeyInfoType"/>
          <xs:element default="false" maxOccurs="1" minOccurs="0"
            name="ReturnProcessingDetails" type="xs:boolean"/>
          <xs:element default="false" maxOccurs="1" minOccurs="0"
            name="ReturnSigningTimeInfo" type="xs:boolean"/>
          <xs:element default="false" maxOccurs="1" minOccurs="0"
            name="ReturnSignerIdentity" type="xs:boolean"/>
          <xs:element maxOccurs="unbounded" minOccurs="0"
            name="ReturnAugmentedSignature"
            type="dss2:AugmentSignatureInstructionType"/>
          <xs:element maxOccurs="unbounded" minOccurs="0"
            name="ReturnTransformedDocument"
            type="dss2:ReturnTransformedDocumentType"/>
          <xs:element maxOccurs="1" minOccurs="0"
            name="ReturnTimestampedSignature"
            type="dss2:AugmentSignatureInstructionType"/>
          <xs:element default="false" maxOccurs="1" minOccurs="0"
            name="VerifyManifests" type="xs:boolean"/>
        </xs:choice>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of `OptionalInputsVerifyType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.5.2-2]

4.3.6 Component OptionalOutputsBase

The `OptionalOutputsBase` contains a common set of additional outputs associated with the processing of the request. The client MAY request the server to respond with certain optional outputs by sending certain optional inputs. The server MAY also respond with outputs the client didn't request, depending on the server's profile and policy. « If a server does not recognize or can not handle any optional input, it MUST reject the request with a `ResultMajor` code of `RequesterError` and a `ResultMinor` code of `NotSupported`. » [DSS-4.3.6-1]

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `TransformedDocument` element MUST contain a sub-component. » [DSS-4.3.6-2] « A given element MUST satisfy the requirements specified in this document in section 4.3.34. » [DSS-4.3.6-3] The `TransformedDocument` element contains a document corresponding to the specified `<ds:Reference>`, after all the transforms in the reference have been applied. In other words, the hash value of the returned document should equal the `<ds:Reference>` element's `<ds:DigestValue>`.
- « The optional `Schemas` element MUST contain a sub-component. » [DSS-4.3.6-4] « A given element MUST satisfy the requirements specified in this document in section 4.3.10. » [DSS-4.3.6-5] The `Schemas` element is typically used as an optional input in a `VerifyRequest`. However, there are situations where it may be used as an optional output. For example, a service that makes use of the `ReturnUpdatedSignature` mechanism may, after verifying a signature over an input document, generate a signature over a document of a different schema than the input document. In this case the `Schemas` element MAY be used to communicate the XML schemas required for validating a returned XML document.
- « The optional `DocumentWithSignature` element MUST contain a sub-component. » [DSS-4.3.6-6] « A given element MUST satisfy the requirements specified in this document. » [DSS-4.3.6-7] `DocumentWithSignature` element contains the input document with the signature inserted.

A set of sub-components is inherited from component 4.1.9 and is not repeated here.

4.3.6.1 OptionalOutputsBase – JSON Syntax

The component `OptionalOutputsBase` is abstract and therefore has no JSON definition.

4.3.6.2 OptionalOutputsBase – XML Syntax

« The XML type `OptionalOutputsBaseType` SHALL implement the requirements defined in the `OptionalOutputsBase` component. » [XDSS-4.3.6.2-1]

The `OptionalOutputsBaseType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType abstract="true" name="OptionalOutputsBaseType">
  <xs:complexContent>
    <xs:extension base="dsb:OptionalOutputsType">
      <xs:sequence>
        <xs:choice>
          <xs:element maxOccurs="1" minOccurs="0" name="TransformedDocument"
            type="dss2:TransformedDocumentType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="Schemas"
            type="dss2:SchemasType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="DocumentWithSignature"
            type="dss2:DocumentWithSignatureType"/>
        </xs:choice>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

« Each child element of `OptionalOutputsBaseType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.6.2-2]

4.3.7 Component OptionalOutputsSign

The OptionalOutputsSignType component defines a set of additional outputs associated with the processing of a signing request. This document does not define any additional outputs but profiles may extend the set of additional outputs.

Below follows a list of the sub-components that MAY be present within this component:

There are no sub-components specific to this component.

A set of sub-components is inherited from component 4.3.6 and is not repeated here.

4.3.7.1 OptionalOutputsSign – JSON Syntax

« The OptionalOutputsSignType JSON object SHALL implement in JSON syntax the requirements defined in the OptionalOutputsSign component. » [JDSS-4.3.7.1-1]

The OptionalOutputsSignType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-OptionalOutputsSignType": {
  "type": "object",
  "properties": {
    "policy": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "other": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-AnyType"
      }
    },
    "transformed": {
      "$ref": "#/definitions/dss2-TransformedDocumentType"
    },
    "schemas": {
      "$ref": "#/definitions/dss2-SchemasType"
    },
    "docWithSignature": {
      "$ref": "#/definitions/dss2-DocumentWithSignatureType"
    }
  }
}
```

4.3.7.2 OptionalOutputsSign – XML Syntax

« The XML type OptionalOutputsSignType SHALL implement the requirements defined in the OptionalOutputsSign component. » [XDSS-4.3.7.2-1]

The OptionalOutputsSignType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="OptionalOutputsSignType">
  <xs:complexContent>
    <xs:extension base="dss2:OptionalOutputsBaseType"/>
  </xs:complexContent>
</xs:complexType>
```

« Each child element of `OptionalOutputsSignType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.7.2-2]

4.3.8 Component `OptionalOutputsVerify`

The `OptionalOutputsVerify` component defines a set of additional outputs associated with the processing of a verification request.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `VerifyManifestResults` element MUST contain a sub-component. » [DSS-4.3.8-1] « A given element MUST satisfy the requirements specified in this document in section 4.3.23. » [DSS-4.3.8-2]
- « The optional `SigningTimeInfo` element MUST contain a sub-component. » [DSS-4.3.8-3] « A given element MUST satisfy the requirements specified in this document in section 4.3.31. » [DSS-4.3.8-4] The `SigningTimeInfo` element returns the signature's creation date and time. « When there is no way for the server to determine the signing time, the server MUST omit this element. » [DSS-4.3.8-5]
- « The optional `VerificationTimeInfo` element MUST contain a sub-component. » [DSS-4.3.8-6] « A given element MUST satisfy the requirements specified in this document in section 4.3.27. » [DSS-4.3.8-7] In addition to the verification time, the server MAY include in the `VerificationTimeInfo` element any other relevant time instants that may have been used when determining the verification time or that may be useful for its qualification.
- « The optional `ProcessingDetails` element MUST contain a sub-component. » [DSS-4.3.8-8] « A given element MUST satisfy the requirements specified in this document in section 4.3.29. » [DSS-4.3.8-9] The `ProcessingDetails` element elaborates on what signature verification steps succeeded or failed.
- « The optional `SignerIdentity` element MUST contain a sub-component. » [DSS-4.3.8-10] « A given element MUST satisfy the requirements specified in section 4.4.1. » [DSS-4.3.8-11] The `SignerIdentity` element contains an indication of who performed the signature.
- « The optional `AugmentedSignature` element MUST contain a sub-component. » [DSS-4.3.8-12] « A given element MUST satisfy the requirements specified in this document in section 4.3.32. » [DSS-4.3.8-13] This element contains the processed signature.
- « The optional `TimestampedSignature` element MUST contain a sub-component. » [DSS-4.3.8-14] « A given element MUST satisfy the requirements specified in this document in section 4.3.32. » [DSS-4.3.8-15] The `TimestampedSignature` element contains the returned timestamped signature.

A set of sub-components is inherited from component 4.3.6 and is not repeated here.

4.3.8.1 `OptionalOutputsVerify` – JSON Syntax

« The `OptionalOutputsVerifyType` JSON object SHALL implement in JSON syntax the requirements defined in the `OptionalOutputsVerify` component. » [JDSS-4.3.8.1-1]

« Properties of the JSON object SHALL implement the sub-components of `OptionalOutputsVerify` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
---------	-------------------------------

VerifyManifestResults	result
SigningTimeInfo	signingTimeInfo
VerificationTimeInfo	verificationTimeInfo
ProcessingDetails	procDetails
SignerIdentity	signerIdentity
AugmentedSignature	augSig
TimestampedSignature	timestampedSig

» [JDSS-4.3.8.1-2](#)

The `OptionalOutputsVerifyType` JSON object is defined in the JSON schema [DSBJSON](#) and is provided below as a service to the reader.

```

"dss2-OptionalOutputsVerifyType": {
  "type": "object",
  "properties": {
    "policy": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "other": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-AnyType"
      }
    },
    "transformed": {
      "$ref": "#/definitions/dss2-TransformedDocumentType"
    },
    "schemas": {
      "$ref": "#/definitions/dss2-SchemasType"
    },
    "docWithSignature": {
      "$ref": "#/definitions/dss2-DocumentWithSignatureType"
    },
    "result": {
      "$ref": "#/definitions/dss2-VerifyManifestResultsType"
    },
    "signingTimeInfo": {
      "$ref": "#/definitions/dss2-SigningTimeInfoType"
    },
    "verificationTimeInfo": {
      "$ref": "#/definitions/dss2-VerificationTimeInfoType"
    },
    "procDetails": {
      "$ref": "#/definitions/dss2-ProcessingDetailsType"
    },
    "signerIdentity": {
      "$ref": "#/definitions/saml2rw-NameIDType"
    },
    "augSig": {
      "$ref": "#/definitions/dss2-AugmentedSignatureType"
    },
    "timestampedSig": {
      "$ref": "#/definitions/dss2-AugmentedSignatureType"
    }
  }
}

```

4.3.8.2 OptionalOutputsVerify – XML Syntax

« The XML type `OptionalOutputsVerifyType` SHALL implement the requirements defined in the `OptionalOutputsVerify` component. » [XDSS-4.3.8.2-1]

The `OptionalOutputsVerifyType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="OptionalOutputsVerifyType">
  <xs:complexContent>
    <xs:extension base="dss2:OptionalOutputsBaseType">
      <xs:sequence>
        <xs:choice>
          <xs:element maxOccurs="1" minOccurs="0" name="VerifyManifestResults"
            type="dss2:VerifyManifestResultsType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="SigningTimeInfo"
            type="dss2:SigningTimeInfoType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="VerificationTimeInfo"
            type="dss2:VerificationTimeInfoType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="ProcessingDetails"
            type="dss2:ProcessingDetailsType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="SignerIdentity"
            type="saml2-rw:NameIDType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="AugmentedSignature"
            type="dss2:AugmentedSignatureType"/>
          <xs:element maxOccurs="1" minOccurs="0" name="TimestampedSignature"
            type="dss2:AugmentedSignatureType"/>
        </xs:choice>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

« Each child element of `OptionalOutputsVerifyType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.8.2-2]

4.3.9 Component ClaimedIdentity

This element indicates the identity of the client who is making a request. The server MAY use this to parameterize any aspect of its processing. « Profiles that make use of this element MUST define its semantics. » [DSS-4.3.9-1]

Below follows a list of the sub-components that MAY be present within this component:

- « The `Name` element MUST contain one instance of a sub-component. » [DSS-4.3.8-2] « This element MUST satisfy the requirements specified in section 4.4.1. » [DSS-4.3.9-3] The claimed identity may be authenticated using the security binding, according to section 6, or using authentication data provided in the `SupportingInfo` element. « The server MUST check that the asserted `Name` is authenticated before relying upon the `Name`. » [DSS-4.3.9-4]
- « The optional `SupportingInfo` element MUST contain a sub-component. » [DSS-4.3.9-5]
- « A given element MUST satisfy the requirements specified in this document in section 4.1.2. » [DSS-4.3.9-6] The `SupportingInfo` element can be used by profiles to carry information related to the claimed identity. One possible use of `SupportingInfo` is to carry authentication data that authenticates the request as originating from the claimed identity (examples of authentication data include a password or SAML Assertion, a signature or MAC calculated over the request using a client key).

4.3.9.1 ClaimedIdentity – JSON Syntax

« The `ClaimedIdentityType` JSON object SHALL implement in JSON syntax the requirements defined in the `ClaimedIdentity` component. » [JDSS-4.3.9.1-1]

« Properties of the JSON object SHALL implement the sub-components of `ClaimedIdentity` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Name	name
SupportingInfo	suppInfo

» [JDSS-4.3.9.1-2]

The ClaimedIdentityType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-ClaimedIdentityType": {
  "type": "object",
  "properties": {
    "name": {
      "$ref": "#/definitions/saml2rw-NameIDType"
    },
    "suppInfo": {
      "$ref": "#/definitions/dsb-AnyType"
    }
  },
  "required": ["name"]
}
```

4.3.9.2 ClaimedIdentity – XML Syntax

« The XML type ClaimedIdentityType SHALL implement the requirements defined in the ClaimedIdentity component. » [XDSS-4.3.9.2-1]

The ClaimedIdentityType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="ClaimedIdentityType">
  <xs:sequence>
    <xs:element name="Name" type="saml2-rw:NameIDType"/>
    <xs:element minOccurs="0" name="SupportingInfo" type="dsb:AnyType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of ClaimedIdentityType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.9.2-2]

4.3.10 Component Schemas

The Schemas component provides an in-band mechanism for communicating XML schemas required for validating an XML document.

Below follows a list of the sub-components that MAY be present within this component:

« The `Schema` element MUST occur 1 or more times containing a sub-component. » [DSS-4.3.10-1] « Each instance MUST satisfy the requirements specified in this document in section 4.2.3. » [DSS-4.3.10-2]

Non-normative Comment:

Note: It is recommended to use `xml:id` as defined in [xml:id] as `id` in the payload being referenced by a `<ds:Reference>`, because the schema then does not have to be supplied for identifying the `Id` attributes.

4.3.10.1 Schemas – JSON Syntax

« The `SchemasType` JSON object SHALL implement in JSON syntax the requirements defined in the `Schemas` component. » [JDSS-4.3.10.1-1]

« Properties of the JSON object SHALL implement the sub-components of `Schemas` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Schema	<code>schema</code>

» [JDSS-4.3.10.1-2]

The `SchemasType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-SchemasType": {
  "type": "object",
  "properties": {
    "schema": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DocumentType"
      }
    }
  },
  "required": ["schema"]
}
```

4.3.10.2 Schemas – XML Syntax

« The XML type `SchemasType` SHALL implement the requirements defined in the `Schemas` component. » [XDSS-4.3.10.2-1]

The `SchemasType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="SchemasType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" name="Schema" type="dss2:DocumentType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `SchemasType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.10.2-2]

4.3.11 Component AugmentSignatureInstruction

The AugmentSignatureInstruction component can be used as an optional input for both signing and verification requests and defines the type of augmentation that SHOULD be applied. The augmented signature will be returned in an AugmentedSignature (see section 4.3.32) or a DocumentWithSignature component. ESI defines the term 'augmentation' as follows in ETSI TR 119 001 [ESIFrame]: "signature augmentation: process of incorporating to a digital signature information aiming to maintain the validity of that signature over the long term"

Below follows a list of the sub-components that MAY be present within this component:

|| « The optional Type element MUST contain one instance of a URI. » [DSS-4.3.11-1]

4.3.11.1 AugmentSignatureInstruction – JSON Syntax

« The AugmentSignatureInstructionType JSON object SHALL implement in JSON syntax the requirements defined in the AugmentSignatureInstruction component. » [JDSS-4.3.11.1-1]

« Properties of the JSON object SHALL implement the sub-components of AugmentSignatureInstruction using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Type	type

» [JDSS-4.3.11.1-2]

The AugmentSignatureInstructionType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-AugmentSignatureInstructionType": {
  "type": "object",
  "properties": {
    "type": {
      "type": "string",
      "format": "uri"
    }
  }
}
```

4.3.11.2 AugmentSignatureInstruction – XML Syntax

« The XML type AugmentSignatureInstructionType SHALL implement the requirements defined in the AugmentSignatureInstruction component. » [XDSS-4.3.11.2-1]

The AugmentSignatureInstructionType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="AugmentSignatureInstructionType">
  <xs:attribute name="Type" type="xs:anyURI" use="optional"/>
</xs:complexType>
```

« Each child element of AugmentSignatureInstructionType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.11.2-2]

4.3.12 Component IntendedAudience

The `IntendedAudience` element tells the server who the target audience of this signature is. The server MAY use this to parameterize any aspect of its processing (for example, the server MAY choose to sign with a key that it knows a particular recipient trusts).

Below follows a list of the sub-components that MAY be present within this component:

« The `Recipient` element MUST occur 1 or more times containing a sub-component. » [DSS-4.3.12-1] « Each instance MUST satisfy the requirements specified in section 4.4.1. » [DSS-4.3.12-2]

4.3.12.1 IntendedAudience – JSON Syntax

« The `IntendedAudienceType` JSON object SHALL implement in JSON syntax the requirements defined in the `IntendedAudience` component. » [JDSS-4.3.12.1-1]

« Properties of the JSON object SHALL implement the sub-components of `IntendedAudience` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Recipient	<code>recipient</code>

» [JDSS-4.3.12.1-2]

The `IntendedAudienceType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-IntendedAudienceType": {
  "type": "object",
  "properties": {
    "recipient": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/saml2rw-NameIDType"
      }
    }
  },
  "required": ["recipient"]
}
```

4.3.12.2 IntendedAudience – XML Syntax

« The XML type `IntendedAudienceType` SHALL implement the requirements defined in the `IntendedAudience` component. » [XDSS-4.3.12.2-1]

The `IntendedAudienceType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="IntendedAudienceType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" name="Recipient"
      type="saml2-rw:NameIDType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `IntendedAudienceType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.12.2-2]

4.3.13 Component KeySelector

The `KeySelector` component holds data that selects a specific key or certificate or group of certificates.

« Only one of its sub-components MUST be present. » [DSS-4.3.13-1]

But a `KeySelector` component can occur multiple times as a sub-component in the `OptionalInputsSign` component

Below follows a list of the sub-components that MAY be present within this component:

« The optional `X509Digest` element MUST contain one instance of a sub-component. » [DSS-4.3.13-2] « This element MUST satisfy the requirements specified in this document in section 4.3.14. » [DSS-4.3.13-3]

« The optional `X509SubjectName` element MUST contain one instance of a string. » [DSS-4.3.13-4] The `X509SubjectName` element contains an X.509 subject distinguished name that SHOULD be represented as a string that complies with section 3 of RFC4514 [LDAP-DN].

« The optional `X509SKI` element MUST contain one instance of base64 encoded binary data. » [DSS-4.3.13-5] The `X509SKI` element contains the base64 encoded plain (i.e. non-DER-encoded) value of a X509 V.3 SubjectKeyIdentifier extension.

« The optional `X509Certificate` element MUST contain one instance of base64 encoded binary data. » [DSS-4.3.13-6] The `X509Certificate` element contains a base64-encoded [X509V3] certificate.

« The optional `KeyName` element MUST contain one instance of a string. » [DSS-4.3.13-7] It selects a key to be used for signing in a generic way. Usually the client knows about the valid values for `KeyName`.

4.3.13.1 KeySelector – JSON Syntax

« The `KeySelectorType` JSON object SHALL implement in JSON syntax the requirements defined in the `KeySelector` component. » [JDSS-4.3.13.1-1]

« Properties of the JSON object SHALL implement the sub-components of `KeySelector` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>X509Digest</code>	<code>x509Digest</code>
<code>X509SubjectName</code>	<code>sub</code>
<code>X509SKI</code>	<code>ski</code>
<code>X509Certificate</code>	<code>cert</code>
<code>KeyName</code>	<code>name</code>

» [JDSS-4.3.13.1-2]

The `KeySelectorType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-KeySelectorType": {
  "type": "object",
  "properties": {
    "x509Digest": {
      "$ref": "#/definitions/dss2-X509DigestType"
    },
    "sub": {
      "type": "string"
    },
    "ski": {
      "type": "string"
    },
    "cert": {
      "type": "string"
    },
    "name": {
      "type": "string"
    }
  },
  "minProperties": 1,
  "maxProperties": 1
}

```

4.3.13.2 KeySelector – XML Syntax

« The XML type `KeySelectorType` SHALL implement the requirements defined in the `KeySelector` component. » [XDSS-4.3.13.2-1]

The `KeySelectorType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="KeySelectorType">
  <xs:choice>
    <xs:element name="X509Digest" type="dss2:X509DigestType"/>
    <xs:element name="X509SubjectName" type="xs:string"/>
    <xs:element name="X509SKI" type="xs:base64Binary"/>
    <xs:element name="X509Certificate" type="xs:base64Binary"/>
    <xs:element name="KeyName" type="xs:string"/>
  </xs:choice>
</xs:complexType>

```

« Each child element of `KeySelectorType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.13.2-2]

4.3.14 Component X509Digest

The `X509Digest` component contains a base64-encoded digest of a certificate. The digest algorithm URI is identified with a required `Algorithm` element. « The input to the digest MUST be the raw octets that would be base64-encoded of a `X509Certificate`. » [DSS-4.3.14-1]

Below follows a list of the sub-components that MAY be present within this component:

« The `value` element MUST contain one instance of base64 encoded binary data. » [DSS-4.3.14-2]

« The `Algorithm` element MUST contain one instance of a string. » [DSS-4.3.14-3] The string describes the digest algorithm in an appropriate way for the server-side processing. Depending on the signature format this may be an OID (e.g. '2.16.840.1.101.3.4.2.1'), an URI (e.g. 'http://www.w3.org/2001/04/xmlenc#sha256') or a descriptive string ('SHA-256').

4.3.14.1 X509Digest – JSON Syntax

« The X509DigestType JSON object SHALL implement in JSON syntax the requirements defined in the X509Digest component. » [JDSS-4.3.14.1-1]

« Properties of the JSON object SHALL implement the sub-components of X509Digest using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
value	value
Algorithm	alg

» [JDSS-4.3.14.1-2]

The X509DigestType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-X509DigestType": {
  "type": "object",
  "properties": {
    "value": {
      "type": "string"
    },
    "alg": {
      "type": "string"
    }
  },
  "required": ["alg"]
}
```

4.3.14.2 X509Digest – XML Syntax

« The XML type X509DigestType SHALL implement the requirements defined in the X509Digest component. » [XDSS-4.3.14.2-1]

The X509DigestType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="X509DigestType">
  <xs:simpleContent>
    <xs:extension base="xs:base64Binary">
      <xs:attribute name="Algorithm" type="xs:string" use="required"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
```

« Each child element of X509DigestType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.14.2-2]

The element 'value' holding the base64 content is represented by the component's XML tag text content.

4.3.15 Component PropertiesHolder

The PropertiesHolder component is used to request that the server add certain signed or unsigned properties (aka "signature attributes") into the signature. The client can send the server a particular value to use for each property, or leave the value up to the server to determine. The server can add additional properties, even if these aren't requested by the client.

Below follows a list of the sub-components that MAY be present within this component:

« The optional `SignedProperties` element MUST contain a sub-component. » [DSS-4.3.15-1] « A given element MUST satisfy the requirements specified in this document in section 4.3.16. » [DSS-4.3.15-2] These properties will be covered by the signature.

« The optional `UnsignedProperties` element MUST contain a sub-component. » [DSS-4.3.15-3] « A given element MUST satisfy the requirements specified in this document in section 4.3.16. » [DSS-4.3.15-4] These properties will not be covered by the signature.

4.3.15.1 PropertiesHolder – JSON Syntax

« The `PropertiesHolderType` JSON object SHALL implement in JSON syntax the requirements defined in the `PropertiesHolder` component. » [JDSS-4.3.15.1-1]

« Properties of the JSON object SHALL implement the sub-components of `PropertiesHolder` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
SignedProperties	<code>signedProps</code>
UnsignedProperties	<code>unsignedProps</code>

» [JDSS-4.3.15.1-2]

The `PropertiesHolderType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-PropertiesHolderType": {
  "type": "object",
  "properties": {
    "signedProps": {
      "$ref": "#/definitions/dss2-PropertiesType"
    },
    "unsignedProps": {
      "$ref": "#/definitions/dss2-PropertiesType"
    }
  }
}
```

4.3.15.2 PropertiesHolder – XML Syntax

« The XML type `PropertiesHolderType` SHALL implement the requirements defined in the `PropertiesHolder` component. » [XDSS-4.3.15.2-1]

The `PropertiesHolderType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="PropertiesHolderType">
  <xs:sequence>
    <xs:element minOccurs="0" name="SignedProperties"
      type="dss2:PropertiesType"/>
    <xs:element minOccurs="0" name="UnsignedProperties"
      type="dss2:PropertiesType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `PropertiesHolderType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.15-2]

4.3.16 Component Properties

Below follows a list of the sub-components that MAY be present within this component:

« The `Property` element MUST occur 1 or more times containing a sub-component. » [DSS-4.3.16-1] « Each instance MUST satisfy the requirements specified in this document in section 4.3.17. » [DSS-4.3.16-2]

4.3.16.1 Properties – JSON Syntax

« The `PropertiesType` JSON object SHALL implement in JSON syntax the requirements defined in the `Properties` component. » [JDSS-4.3.16.1-1]

« Properties of the JSON object SHALL implement the sub-components of `Properties` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>Property</code>	<code>prop</code>

» [JDSS-4.3.16.1-2]

The `PropertiesType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-PropertiesType": {
  "type": "object",
  "properties": {
    "prop": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-PropertyType"
      }
    }
  },
  "required": ["prop"]
}
```

4.3.16.2 Properties – XML Syntax

« The XML type `PropertiesType` SHALL implement the requirements defined in the `Properties` component. » [XDSS-4.3.16.2-1]

The `PropertiesType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="PropertiesType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" name="Property"
      type="dss2:PropertyType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `PropertiesType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.16.2-2]

4.3.17 Component Property

Below follows a list of the sub-components that MAY be present within this component:

« The Identifier element MUST contain one instance of a string. » [DSS-4.3.17-1]

« The optional Value element MUST contain a sub-component. » [DSS-4.3.17-2] « A given element MUST satisfy the requirements specified in this document in section 4.1.2. » [DSS-4.3.17-3] The Value element contains arbitrary content wrapped in a Component Any.

4.3.17.1 Property – JSON Syntax

« The PropertyType JSON object SHALL implement in JSON syntax the requirements defined in the Property component. » [JDSS-4.3.17.1-1]

« Properties of the JSON object SHALL implement the sub-components of Property using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Identifier	id
Value	val

» [JDSS-4.3.17.1-2]

The PropertyType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-PropertyType": {
  "type": "object",
  "properties": {
    "id": {
      "type": "string"
    },
    "val": {
      "$ref": "#/definitions/dsb-AnyType"
    }
  },
  "required": ["id"]
}
```

4.3.17.2 Property – XML Syntax

« The XML type PropertyType SHALL implement the requirements defined in the Property component. » [XDSS-4.3.17.2-1]

The PropertyType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="PropertyType">
  <xs:sequence>
    <xs:element name="Identifier" type="xs:string"/>
    <xs:element minOccurs="0" name="Value" type="dsb:AnyType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of PropertyType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.17.2-2]

Therefore, it occurs in the XML schema, too.

4.3.18 Component IncludeObject

The `IncludeObject` component is used to request the creation of an XMLSig enveloping signature. Multiple occurrences of this optional input can be present in a single `SignRequest` message. Each occurrence will cause the inclusion of an object inside the signature being created.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `WhichDocument` element MUST contain one instance of a unique identifier reference. » [DSS-4.3.18-1] This element identifies the input document which will be inserted into the returned signature.
- « The optional `hasObjectTagsAndAttributesSet` element MUST contain one instance of a boolean. » [DSS-4.3.18-2] Its default value is 'false'. If 'true' this element indicates that the Document contains a `<ds:Object>` element which has been prepared ready for direct inclusion in the `<ds:Signature>`.
- « The optional `ObjId` element MUST contain one instance of a string. » [DSS-4.3.18-3] It sets the Id attribute on the returned `<ds:Object>`.
- « The optional `createReference` element MUST contain one instance of a boolean. » [DSS-4.3.18-4] Its default value is 'true'. If the `createReference` element is set to false inhibits the creation of the `<ds:Reference>` associated to the `RefURI` element of the input document referred by the `WhichDocument` element, effectively allowing clients to include `<ds:Object>` elements not covered/protected by the signature being created.

4.3.18.1 IncludeObject – JSON Syntax

« The `IncludeObjectType` JSON object SHALL implement in JSON syntax the requirements defined in the `IncludeObject` component. » [JDSS-4.3.18.1-1]

« Properties of the JSON object SHALL implement the sub-components of `IncludeObject` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>WhichDocument</code>	<code>whichDoc</code>
<code>hasObjectTagsAndAttributesSet</code>	<code>hasObjectTagsAndAttributesSet</code>
<code>ObjId</code>	<code>objId</code>
<code>createReference</code>	<code>createRef</code>

» [JDSS-4.3.18.1-2]

The `IncludeObjectType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-IncludeObjectType": {
  "type": "object",
  "properties": {
    "whichDoc": {
      "$ref": "#/definitions/dss2-DocumentBaseType"
    },
    "hasObjectTagsAndAttributesSet": {
      "type": "boolean",
      "default": "false"
    },
    "objId": {
      "type": "string"
    },
    "createRef": {
      "type": "boolean",
      "default": "true"
    }
  }
}

```

4.3.18.2 IncludeObject – XML Syntax

« The XML type IncludeObjectType SHALL implement the requirements defined in the IncludeObject component. » [XDSS-4.3.18.2-1]

The IncludeObjectType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="IncludeObjectType">
  <xs:attribute name="WhichDocument" type="xs:IDREF"/>
  <xs:attribute default="false" name="hasObjectTagsAndAttributesSet"
    type="xs:boolean"/>
  <xs:attribute name="ObjId" type="xs:string" use="optional"/>
  <xs:attribute default="true" name="createReference" type="xs:boolean"
    use="optional"/>
</xs:complexType>

```

« Each child element of IncludeObjectType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.18.2-2]

4.3.19 Component SignaturePlacement

The SignaturePlacement component is used to request the creation of an XMLSig enveloped signature placed within an input document. The resulting document with the enveloped signature is placed in the optional output DocumentWithSignature element. The server places the signature in the document identified using the WhichDocument attribute. In the case of a non-XML input document then the server will return an error unless alternative procedures are defined by a profile or in the server policy for handling such a situation.

Below follows a list of the sub-components that MAY be present within this component:

« The optional `XPathAfter` element MUST contain one instance of a string. » [DSS-4.3.19-1]

This element holds an XPath expression which identifies an element, inside the XML input document, after which the signature will be inserted.

« The optional `XPathFirstChildOf` element MUST contain one instance of a string. » [DSS-4.3.19-2] This element holds an XPath expression which identifies an element, in the XML input document, which the signature will be inserted as the first child of.

The optional `NsPrefixMapping` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.1.1. » [DSS-4.3.19-3]

« The optional `WhichDocument` element MUST contain one instance of a unique identifier reference. » [DSS-4.3.19-4] The `WhichDocument` element identifies the input document which the signature will be inserted into.

« The optional `CreateEnvelopedSignature` element MUST contain one instance of a boolean. » [DSS-4.3.19-5] Its default value is 'true'. If the `CreateEnvelopedSignature` element is set to true a reference having an enveloped signature transform is created.

4.3.19.1 SignaturePlacement – JSON Syntax

« The `SignaturePlacementType` JSON object SHALL implement in JSON syntax the requirements defined in the `SignaturePlacement` component. » [JDSS-4.3.19.1-1]

« Properties of the JSON object SHALL implement the sub-components of `SignaturePlacement` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>XPathAfter</code>	<code>xPathAfter</code>
<code>XPathFirstChildOf</code>	<code>xPathFirstChildOf</code>
<code>NsPrefixMapping</code>	<code>nsDecl</code>
<code>WhichDocument</code>	<code>whichDoc</code>
<code>CreateEnvelopedSignature</code>	<code>createEnvelopedSignature</code>

» [JDSS-4.3.19.1-2]

The `SignaturePlacementType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-SignaturePlacementType": {
  "type": "object",
  "properties": {
    "xpathFirstChildOf": {
      "type": "string"
    },
    "xpathAfter": {
      "type": "string"
    },
    "xPathAfter": {
      "type": "string"
    },
    "xPathFirstChildOf": {
      "type": "string"
    },
    "nsDecl": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-NsPrefixMappingType"
      }
    },
    "whichDoc": {
      "$ref": "#/definitions/dss2-DocumentBaseType"
    },
    "createEnvelopedSignature": {
      "type": "boolean",
      "default": "true"
    }
  }
}

```

4.3.19.2 SignaturePlacement – XML Syntax

« The XML type `SignaturePlacementType` SHALL implement the requirements defined in the `SignaturePlacement` component. » [XDSS-4.3.19.2-1]

The `SignaturePlacementType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="SignaturePlacementType">
  <xs:sequence>
    <xs:choice>
      <xs:element name="XPathAfter" type="xs:string"/>
      <xs:element name="XPathFirstChildOf" type="xs:string"/>
    </xs:choice>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="NsPrefixMapping"
      type="dsb:NsPrefixMappingType"/>
  </xs:sequence>
  <xs:attribute name="WhichDocument" type="xs:IDREF"/>
  <xs:attribute default="true" name="CreateEnvelopedSignature"
    type="xs:boolean"/>
</xs:complexType>

```

« Each child element of `SignaturePlacementType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.19.2-2]

4.3.20 Component DocumentWithSignature

The `DocumentWithSignature` component contains document with the signature inserted as requested with the `SignaturePlacement` component.

Below follows a list of the sub-components that MAY be present within this component:

- « The `Document` element MUST contain one instance of a sub-component. » [DSS-4.3.20-1]
- « This element MUST satisfy the requirements specified in this document in section 4.2.3. » [DSS-4.3.20-2] This contains the input document with a signature inserted in some fashion.

4.3.20.1 DocumentWithSignature – JSON Syntax

« The `DocumentWithSignatureType` JSON object SHALL implement in JSON syntax the requirements defined in the `DocumentWithSignature` component. » [JDSS-4.3.20.1-1]

« Properties of the JSON object SHALL implement the sub-components of `DocumentWithSignature` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>Document</code>	<code>doc</code>

» [JDSS-4.3.20.1-2]

The `DocumentWithSignatureType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-DocumentWithSignatureType": {
  "type": "object",
  "properties": {
    "doc": {
      "$ref": "#/definitions/dss2-DocumentType"
    }
  },
  "required": ["doc"]
}
```

4.3.20.2 DocumentWithSignature – XML Syntax

« The XML type `DocumentWithSignatureType` SHALL implement the requirements defined in the `DocumentWithSignature` component. » [XDSS-4.3.20.2-1]

The `DocumentWithSignatureType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="DocumentWithSignatureType">
  <xs:sequence>
    <xs:element name="Document" type="dss2:DocumentType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `DocumentWithSignatureType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.20.2-2]

4.3.21 Component SignedReferences

The `SignedReferences` component gives the client greater control over how the `<ds:Reference>` elements are formed.

Below follows a list of the sub-components that MAY be present within this component:

« The `SignedReference` element MUST occur 1 or more times containing a sub-component. » [DSS-4.3.21-1] « Each instance MUST satisfy the requirements specified in this document in section 4.3.22. » [DSS-4.3.21-2]

4.3.21.1 SignedReferences – JSON Syntax

« The `SignedReferencesType` JSON object SHALL implement in JSON syntax the requirements defined in the `SignedReferences` component. » [JDSS-4.3.21.1-1]

« Properties of the JSON object SHALL implement the sub-components of `SignedReferences` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>SignedReference</code>	<code>signedRef</code>

» [JDSS-4.3.21.1-2]

The `SignedReferencesType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-SignedReferencesType": {
  "type": "object",
  "properties": {
    "signedRef": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-SignedReferenceType"
      }
    }
  },
  "required": ["signedRef"]
}
```

4.3.21.2 SignedReferences – XML Syntax

« The XML type `SignedReferencesType` SHALL implement the requirements defined in the `SignedReferences` component. » [XDSS-4.3.21.2-1]

The `SignedReferencesType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="SignedReferencesType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" name="SignedReference"
      type="dss2:SignedReferenceType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `SignedReferencesType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.21.2-2]

4.3.22 Component SignedReference

Each `SignedReference` component refers to an input document and allows multiple `<ds:Reference>` elements to be based on a single input document. Furthermore, the client can request additional transforms to be applied to each `<ds:Reference>`, and can set each `<ds:Reference>` element's `Id` or `URI` attribute. These aspects of the `<ds:Reference>` can only be set through the

`SignedReference` component; they cannot be set through the input documents, since they are aspects of the reference to the input document, not the input document itself.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `Transforms` element MUST contain a sub-component. » [DSS-4.3.2-1] « A given element MUST satisfy the requirements specified in section 4.4.2. » [DSS-4.3.22-2] The `Transforms` element requests the server to perform additional transforms on this reference.
- « The `WhichDocument` element MUST contain one instance of a unique identifier reference. » [DSS-4.3.22-3] This defines which input document this reference refers to.
- « The optional `RefURI` element MUST contain one instance of a URI. » [DSS-4.3.22-4] If this element is present, the corresponding `<ds:Reference>` element's URI attribute is set to its value. If it is not present, the URI attribute is omitted in the corresponding `<ds:Reference>`.
- « The optional `RefId` element MUST contain one instance of a string. » [DSS-4.3.2-5] This element sets the Id attribute of the corresponding `<ds:Reference>`.

4.3.22.1 SignedReference – JSON Syntax

« The `SignedReferenceType` JSON object SHALL implement in JSON syntax the requirements defined in the `SignedReference` component. » [JDSS-4.3.22.1-1]

« Properties of the JSON object SHALL implement the sub-components of `SignedReference` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Transforms	<code>transforms</code>
WhichDocument	<code>whichDoc</code>
RefURI	<code>refURI</code>
RefId	<code>refId</code>

» [JDSS-4.3.22.1-2]

The `SignedReferenceType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-SignedReferenceType": {
  "type": "object",
  "properties": {
    "transforms": {
      "$ref": "#/definitions/dsigrw-TransformsType"
    },
    "whichDoc": {
      "$ref": "#/definitions/dss2-DocumentBaseType"
    },
    "refURI": {
      "type": "string"
    },
    "refId": {
      "type": "string"
    }
  },
  "required": ["whichDoc"]
}
```

4.3.22.2 SignedReference – XML Syntax

« The XML type `SignedReferenceType` SHALL implement the requirements defined in the `SignedReference` component. » [XDSS-4.3.22.2-1]

The `SignedReferenceType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="SignedReferenceType">
  <xs:sequence>
    <xs:element minOccurs="0" name="Transforms" type="ds-rw:TransformsType"/>
  </xs:sequence>
  <xs:attribute name="WhichDocument" type="xs:IDREF" use="required"/>
  <xs:attribute name="RefURI" type="xs:anyURI" use="optional"/>
  <xs:attribute name="RefId" type="xs:string" use="optional"/>
</xs:complexType>
```

« Each child element of `SignedReferenceType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.22.2-2]

4.3.23 Component VerifyManifestResults

The results of verifying individual `<ds:Reference>`'s within a `<ds:Manifest>` are returned in the `VerifyManifestResults` component.

Below follows a list of the sub-components that MAY be present within this component:

« The `ManifestResult` element MUST occur 1 or more times containing a sub-component. » [DSS-4.3.23-1] « Each instance MUST satisfy the requirements specified in this document in section 4.3.24. » [DSS-4.3.23-2]

4.3.23.1 VerifyManifestResults – JSON Syntax

« The `VerifyManifestResultsType` JSON object SHALL implement in JSON syntax the requirements defined in the `VerifyManifestResults` component. » [JDSS-4.3.23.1-1]

« Properties of the JSON object SHALL implement the sub-components of `VerifyManifestResults` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
ManifestResult	<code>signedRef</code>

» [JDSS-4.3.23.1-2]

The `VerifyManifestResultsType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-VerifyManifestResultsType": {
  "type": "object",
  "properties": {
    "signedRef": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-ManifestResultType"
      }
    }
  },
  "required": ["signedRef"]
}
```


4.3.23.2 VerifyManifestResults – XML Syntax

« The XML type `VerifyManifestResultsType` SHALL implement the requirements defined in the `VerifyManifestResults` component. » [XDSS-4.3.23.2-1]

The `VerifyManifestResultsType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="VerifyManifestResultsType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" name="ManifestResult"
      type="dss2:ManifestResultType"/>
  </xs:sequence>
</xs:complexType>
```

« Each child element of `VerifyManifestResultsType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.23.2-2]

4.3.24 Component ManifestResult

The `VerifyManifestResults` component is comprised of one or more `ManifestResult`

Below follows a list of the sub-components that MAY be present within this component:

« The `ReferenceXPath` element MUST contain one instance of a string. » [DSS-4.3.24-1]

This element identifies the manifest reference, in the XML signature, to which this result pertains.

« The `Status` element MUST contain one instance of a URI. » [DSS-4.3.24-2] Its value is limited to an item of the following set:

urn:oasis:names:tc:dss:1.0:manifeststatus:Valid

urn:oasis:names:tc:dss:1.0:manifeststatus:Invalid

This element indicates the manifest validation outcome.

« The optional `NsPrefixMapping` element MAY occur zero or more times containing a sub-component. » [DSS-4.3.24-3] « If present each instance MUST satisfy the requirements

specified in this document in section 4.1.1. » [DSS-4.3.24-4]

4.3.24.1 ManifestResult – JSON Syntax

« The `ManifestResultType` JSON object SHALL implement in JSON syntax the requirements defined in the `ManifestResult` component. » [JDSS-4.3.24.1-1]

« Properties of the JSON object SHALL implement the sub-components of `ManifestResult` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
ReferenceXPath	xPath
Status	status
NsPrefixMapping	nsDecl

» [JDSS-4.3.24.1-2]

The `ManifestResultType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-ManifestResultType": {
  "type": "object",
  "properties": {
    "XPath": {
      "type": "string"
    },
    "status": {
      "type": "string",
      "enum": [
        "urn:oasis:names:tc:dss:1.0:manifeststatus:Valid",
        "urn:oasis:names:tc:dss:1.0:manifeststatus:Invalid"
      ]
    },
    "nsDecl": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-NsPrefixMappingType"
      }
    }
  },
  "required": ["XPath", "status"]
}

```

4.3.24.2 ManifestResult – XML Syntax

« The XML type ManifestResultType SHALL implement the requirements defined in the ManifestResult component. » [XDSS-4.3.24.2-1]

The ManifestResultType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="ManifestResultType">
  <xs:sequence>
    <xs:element name="ReferenceXpath" type="xs:string"/>
    <xs:element name="Status">
      <xs:simpleType>
        <xs:restriction base="xs:anyURI">
          <xs:enumeration
            value="urn:oasis:names:tc:dss:1.0:manifeststatus:Valid"/>
          <xs:enumeration
            value="urn:oasis:names:tc:dss:1.0:manifeststatus:Invalid"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="NsPrefixMapping"
      type="dsb:NsPrefixMappingType"/>
  </xs:sequence>
</xs:complexType>

```

« Each child element of ManifestResultType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.24.2-2]

4.3.25 Component UseVerificationTime

This UseVerificationTime component instructs the server to attempt to determine the signature's validity at the specified time, instead of a time determined by the server policy.

Below follows a list of the sub-components that MAY be present within this component:

« xxx » [DSS-4.3.25-1]The optional `CurrentTime` element MUST contain one instance of a boolean. Its default value is 'false'. This element instructs the server to use its current time (normally the time associated with the server-side request processing).

« xxx » [DSS-4.3.25-2]The optional `SpecificTime` element MUST contain one instance of a date/time value. The `SpecificTime` element allows the client to manage manually the time instant used in the verification process. It SHOULD be expressed as UTC time (Coordinated Universal Time) to reduce confusion with the local time zone use.

« xxx » [DSS-4.3.25-3]The optional `Base64Content` element MUST contain base64 encoded binary data. The `Base64Content` element allows the provision of additional date/time data.

4.3.25.1 UseVerificationTime – JSON Syntax

« The `UseVerificationTimeType` JSON object SHALL implement in JSON syntax the requirements defined in the `UseVerificationTime` component. » [JDSS-4.3.25.1-1]

« Properties of the JSON object SHALL implement the sub-components of `UseVerificationTime` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>CurrentTime</code>	<code>currTime</code>
<code>SpecificTime</code>	<code>specTime</code>
<code>Base64Content</code>	<code>b64Content</code>

» [JDSS-4.3.25.1-2]

The `UseVerificationTimeType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-UseVerificationTimeType": {
  "type": "object",
  "properties": {
    "currTime": {
      "type": "boolean",
      "default": "false"
    },
    "specTime": {
      "type": "integer",
      "format": "utc-millisec"
    },
    "b64Content": {
      "type": "string"
    }
  },
  "minProperties": 1,
  "maxProperties": 1
}
```

4.3.25.2 UseVerificationTime – XML Syntax

« The XML type `UseVerificationTimeType` SHALL implement the requirements defined in the `UseVerificationTime` component. » [XDSS-4.3.25.2-1]

The UseVerificationTimeType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="UseVerificationTimeType">
  <xs:choice>
    <xs:element default="false" name="CurrentTime" type="xs:boolean"/>
    <xs:element name="SpecificTime" type="xs:dateTime"/>
    <xs:element maxOccurs="1" minOccurs="0" name="Base64Content"
      type="xs:base64Binary"/>
  </xs:choice>
</xs:complexType>
```

« Each child element of UseVerificationTimeType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.25.2-2]

4.3.26 Component AdditionalTimeInfo

The AdditionalTimeInfo component contains other time instant(s) relevant in the context of the verification time determination.

Below follows a list of the sub-components that MAY be present within this component:

- « The value element MUST contain one instance of a date/time value. » [DSS-4.3.26-1]
- « The Type element MUST contain one instance of a URI. » [DSS-4.3.26-2] Its value is limited to an item of the following set:
 urn:oasis:names:tc:dss:1.0:additionaltimeinfo:signatureTimestamp
 urn:oasis:names:tc:dss:1.0:additionaltimeinfo:signatureTimemark
 urn:oasis:names:tc:dss:1.0:additionaltimeinfo:signedObjectTimestamp
 urn:oasis:names:tc:dss:1.0:additionaltimeinfo:claimedSigningTime
 The Type attribute qualifies the kind of time information included in the response. « This specification defines the listed types, whose values MUST satisfy the format defined as xs:dateTime and is expressed as UTC time (Coordinated Universal Time). » [DSS-4.3.26-3] Profiles MAY include and define new values for the Type attribute.
- « The optional Ref element MUST contain one instance of a string. » [DSS-4.3.26-4] It allows to establish references to the source of the time information and SHOULD be used when there is a need to disambiguate several AdditionalTimeInfo components with the same Type attribute.

4.3.26.1 AdditionalTimeInfo – JSON Syntax

- « The AdditionalTimeInfoType JSON object SHALL implement in JSON syntax the requirements defined in the AdditionalTimeInfo component. » [JDSS-4.3.26.1-1]
- « Properties of the JSON object SHALL implement the sub-components of AdditionalTimeInfo using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
value	value
Type	type
Ref	ref

» [JDSS-4.3.26.1-2]

The AdditionalTimeInfoType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-AdditionalTimeInfoType": {
  "type": "object",
  "properties": {
    "value": {
      "type": "integer",
      "format": "utc-millisec"
    },
    "type": {
      "type": "string",
      "format": "uri"
    },
    "ref": {
      "type": "string"
    }
  },
  "required": ["type"]
}

```

4.3.26.2 AdditionalTimeInfo – XML Syntax

« The XML type AdditionalTimeInfoType SHALL implement the requirements defined in the AdditionalTimeInfo component. » [XDSS-4.3.26.2-1]

The AdditionalTimeInfoType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="AdditionalTimeInfoType">
  <xs:simpleContent>
    <xs:extension base="xs:dateTime">
      <xs:attribute name="Type" use="required">
        <xs:simpleType>
          <xs:restriction base="xs:anyURI">
            <xs:enumeration
              value="urn:oasis:names:tc:dss:1.0:additionaltimeinfo:signatureTimestamp"/>
            <xs:enumeration
              value="urn:oasis:names:tc:dss:1.0:additionaltimeinfo:signatureTimemark"/>
            <xs:enumeration
              value="urn:oasis:names:tc:dss:1.0:additionaltimeinfo:signedObjectTimestamp"/>
            <xs:enumeration
              value="urn:oasis:names:tc:dss:1.0:additionaltimeinfo:claimedSigningTime"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="Ref" type="xs:string" use="optional"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

```

« Each child element of AdditionalTimeInfoType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.26.2-2]

The element 'value' holding a date/time is represented by the component's XML tag text content.

4.3.27 Component VerificationTimeInfo

The VerificationTimeInfo component allows the client to obtain the time instant used by the server to validate the signature.

Below follows a list of the sub-components that MAY be present within this component:

« The `VerificationTime` element MUST contain one instance of a date/time value. » [DSS-4.3.27-1] This time instant used by the server when verifying the signature. It SHOULD be expressed as UTC time (Coordinated Universal Time) to reduce confusion with the local time zone use.

The optional `AdditionalTimeInfo` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.26. » [DSS-4.3.27-2] The `AdditionalTimeInfo` element can contain any other time instant(s) relevant in the context of the verification time determination.

4.3.27.1 VerificationTimeInfo – JSON Syntax

« The `VerificationTimeInfoType` JSON object SHALL implement in JSON syntax the requirements defined in the `VerificationTimeInfo` component. » [JDSS-4.3.27.1-1]

« Properties of the JSON object SHALL implement the sub-components of `VerificationTimeInfo` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>VerificationTime</code>	<code>verificationTime</code>
<code>AdditionalTimeInfo</code>	<code>additionalTimeInfo</code>

» [JDSS-4.3.27.1-2]

The `VerificationTimeInfoType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-VerificationTimeInfoType": {
  "type": "object",
  "properties": {
    "verificationTime": {
      "type": "integer",
      "format": "utc-millisec"
    },
    "additionalTimeInfo": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-AdditionalTimeInfoType"
      }
    }
  },
  "required": ["verificationTime"]
}
```

4.3.27.2 VerificationTimeInfo – XML Syntax

« The XML type `VerificationTimeInfoType` SHALL implement the requirements defined in the `VerificationTimeInfo` component. » [XDSS-4.3.27.2-1]

The `VerificationTimeInfoType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="VerificationTimeInfoType">
  <xs:sequence>
    <xs:element name="VerificationTime" type="xs:dateTime"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="AdditionalTimeInfo"
      type="dss2:AdditionalTimeInfoType"/>
  </xs:sequence>
</xs:complexType>

```

« Each child element of `VerificationTimeInfoType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.27.2-2]

4.3.28 Component `AdditionalKeyInfo`

The `AdditionalKeyInfo` component provides the server with additional data (such as certificates and CRLs) which it can use to validate the signature.

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `X509Digest` element MUST contain one instance of a sub-component. » [DSS-4.3.28-1] « This element MUST satisfy the requirements specified in this document in section 4.3.14. » [DSS-4.3.28-2]
- « The optional `X509SubjectName` element MUST contain one instance of a string. » [DSS-4.3.28-3]
- « The optional `X509SKI` element MUST contain one instance of base64 encoded binary data. » [DSS-4.3.28-4]
- « The optional `X509Certificate` element MUST contain one instance of base64 encoded binary data. » [DSS-4.3.28-5]
- « The optional `KeyName` element MUST contain one instance of a string. » [DSS-4.3.28-6]
- « The optional `X509CRL` element MUST contain one instance of base64 encoded binary data. » [DSS-4.3.28-7] The `X509CRL` element holds a CRL.

4.3.28.1 `AdditionalKeyInfo` – JSON Syntax

« The `AdditionalKeyInfoType` JSON object SHALL implement in JSON syntax the requirements defined in the `AdditionalKeyInfo` component. » [JDSS-4.3.28.1-1]

« Properties of the JSON object SHALL implement the sub-components of `AdditionalKeyInfo` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>X509Digest</code>	<code>x509Digest</code>
<code>X509SubjectName</code>	<code>sub</code>
<code>X509SKI</code>	<code>ski</code>
<code>X509Certificate</code>	<code>cert</code>
<code>KeyName</code>	<code>name</code>
<code>X509CRL</code>	<code>crl</code>

» [JDSS-4.3.28.1-2]

The `AdditionalKeyInfoType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-AdditionalKeyInfoType": {
  "type": "object",
  "properties": {
    "x509Digest": {
      "$ref": "#/definitions/dss2-X509DigestType"
    },
    "sub": {
      "type": "string"
    },
    "ski": {
      "type": "string"
    },
    "cert": {
      "type": "string"
    },
    "name": {
      "type": "string"
    },
    "crl": {
      "type": "array",
      "items": {
        "type": "integer"
      }
    }
  },
  "minProperties": 1,
  "maxProperties": 1
}
```

4.3.28.2 AdditionalKeyInfo – XML Syntax

« The XML type `AdditionalKeyInfoType` SHALL implement the requirements defined in the `AdditionalKeyInfo` component. » [XDSS-4.3.28.2-1]

The `AdditionalKeyInfoType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="AdditionalKeyInfoType">
  <xs:choice>
    <xs:element name="X509Digest" type="dss2:X509DigestType"/>
    <xs:element name="X509SubjectName" type="xs:string"/>
    <xs:element name="X509SKI" type="xs:base64Binary"/>
    <xs:element name="X509Certificate" type="xs:base64Binary"/>
    <xs:element name="KeyName" type="xs:string"/>
    <xs:element name="X509CRL" type="xs:base64Binary"/>
  </xs:choice>
</xs:complexType>
```

« Each child element of `AdditionalKeyInfoType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.28.2-2]

4.3.29 Component ProcessingDetails

The `ProcessingDetails` component elaborates on what signature verification steps succeeded or failed.

Below follows a list of the sub-components that MAY be present within this component:

The optional `ValidDetail` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.30. » [DSS-4.3.29-1] The `ValidDetail` element holds verification details that were evaluated and found to be valid.

The optional `IndeterminateDetail` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.30. » [DSS-4.3.29-2] The `IndeterminateDetail` element holds verification details that could not be evaluated or were evaluated and returned an indeterminate result.

The optional `InvalidDetail` element MAY occur zero or more times containing a sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.3.30. » [DSS-4.3.29-3] The optional `InvalidDetail` element holds verification details that were evaluated and found to be invalid.

4.3.29.1 ProcessingDetails – JSON Syntax

« The `ProcessingDetailsType` JSON object SHALL implement in JSON syntax the requirements defined in the `ProcessingDetails` component. » [JDSS-4.3.29.1-1]

« Properties of the JSON object SHALL implement the sub-components of `ProcessingDetails` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>ValidDetail</code>	<code>valid</code>
<code>IndeterminateDetail</code>	<code>indeterminate</code>
<code>InvalidDetail</code>	<code>invalid</code>

» [JDSS-4.3.29.1-1]

The `ProcessingDetailsType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-ProcessingDetailsType": {
  "type": "object",
  "properties": {
    "valid": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DetailType"
      }
    },
    "indeterminate": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DetailType"
      }
    },
    "invalid": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dss2-DetailType"
      }
    }
  }
}

```

4.3.29.2 ProcessingDetails – XML Syntax

« The XML type `ProcessingDetailsType` SHALL implement the requirements defined in the `ProcessingDetails` component. » [XDSS-4.3.29.2-1]

The `ProcessingDetailsType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="ProcessingDetailsType">
  <xs:sequence>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="ValidDetail"
      type="dss2:DetailType"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="IndeterminateDetail"
      type="dss2:DetailType"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="InvalidDetail"
      type="dss2:DetailType"/>
  </xs:sequence>
</xs:complexType>

```

« Each child element of `ProcessingDetailsType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.29.2-2]

4.3.30 Component Detail

Below follows a list of the sub-components that MAY be present within this component:

- « The optional `Code` element MUST contain a URI. » [DSS-4.3.30-1] This URI which more precisely specifies why this detail is valid, invalid, or indeterminate. It must be a value defined by some other specification, since this specification defines no values for this element.
- « The optional `Message` element MUST contain a sub-component. » [DSS-4.3.30-2] « A given element MUST satisfy the requirements specified in this document in section 4.1.3. » [DSS-4.3.30-3] This is a human-readable message which MAY be logged, used for debugging, etc.
- « The optional `Base64Content` element MUST contain base64 encoded binary data. » [DSS-4.3.30-4]

« The `Type` element MUST contain one instance of a URI. » [DSS-4.3.30-5] The `Type` URI identifies the detail. It MAY be a value defined by this specification, or a value defined by some other specification. Multiple detail elements of the same `Type` may appear in a single `ProcessingDetails` component. For example, when a signature contains a certificate chain that certifies the signing key, there MAY be details of the same `Type` present for each certificate in the chain, describing how each certificate was processed.

Non-normative Comment:

Multiple detail elements of the same `Type` may appear in a single `ProcessingDetails`. For example, when a signature contains a certificate chain that certifies the signing key, there may be details of the same `Type` present for each certificate in the chain, describing how each certificate was processed.

4.3.30.1 Detail – JSON Syntax

« The `DetailType` JSON object SHALL implement in JSON syntax the requirements defined in the `Detail` component. » [JDSS-4.3.30.1-1]

« Properties of the JSON object SHALL implement the sub-components of `Detail` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Code	<code>code</code>
Message	<code>msg</code>
Base64Content	<code>b64Content</code>
Type	<code>type</code>

» [JDSS-4.3.30.1-2]

The `DetailType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-DetailType": {
  "type": "object",
  "properties": {
    "code": {
      "type": "string"
    },
    "msg": {
      "$ref": "#/definitions/dsb-InternationalStringType"
    },
    "b64Content": {
      "type": "string"
    },
    "type": {
      "type": "string",
      "format": "uri"
    }
  },
  "required": ["type"]
}
```

4.3.30.2 Detail – XML Syntax

« The XML type `DetailType` SHALL implement the requirements defined in the `Detail` component. » [XDSS-4.3.30.2-1]

The `DetailType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="DetailType">
  <xs:sequence>
    <xs:element minOccurs="0" name="Code" type="xs:anyURI"/>
    <xs:element minOccurs="0" name="Message"
      type="dsb:InternationalStringType"/>
    <xs:element maxOccurs="1" minOccurs="0" name="Base64Content"
      type="xs:base64Binary"/>
  </xs:sequence>
  <xs:attribute name="Type" type="xs:anyURI" use="required"/>
</xs:complexType>
```

« Each child element of `DetailType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.30.2-2]

4.3.31 Component SigningTimeInfo

This `SigningTimeInfo` component allows the client to obtain the time instant associated to the signature creation.

Below follows a list of the sub-components that MAY be present within this component:

- « The `SigningTime` element MUST contain one instance of a date/time value. » [DSS-4.3.31-1] This element returns the time value considered by the server to be the signature creation time.
- « The optional `SigningTimeBoundaries` element MUST contain sub-components. » [DSS-4.3.31-2] This element returns the trusted time values considered as lower and upper limits for the signing time.
- « The optional `LowerBoundary` element MUST contain a date/time value. » [DSS-4.3.31-3]
- « The `SigningTimeBoundaries` element MUST contain at least one of the `LowerBoundary` or `UpperBoundary` elements. » [DSS-4.3.31-4]
- « The optional `UpperBoundary` element MUST contain a date/time value. » [DSS-4.3.31-5]
- « The `SigningTimeBoundaries` element MUST contain at least one of the `LowerBoundary` or `UpperBoundary` elements. » [DSS-4.3.31-6]

4.3.31.1 SigningTimeInfo – JSON Syntax

« The `SigningTimeInfoType` JSON object SHALL implement in JSON syntax the requirements defined in the `SigningTimeInfo` component. » [JDSS-4.3.31.1-1]

```

"dss2-SigningTimeInfoType:SigningTimeBoundaries": {
  "type": "object",
  "properties": {
    "lowerBound": {
      "type": "integer",
      "format": "utc-millisec"
    },
    "upperBound": {
      "type": "integer",
      "format": "utc-millisec"
    }
  }
}

```

« Properties of the JSON object SHALL implement the sub-components of `SigningTimeInfo` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
SigningTime	<code>signingTime</code>
SigningTimeBoundaries	<code>signingTimeBounds</code>
LowerBoundary	<code>lowerBound</code>
UpperBoundary	<code>upperBound</code>

» [JDSS-4.3.31-2]

The `SigningTimeInfoType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-SigningTimeInfoType": {
  "type": "object",
  "properties": {
    "signingTime": {
      "type": "integer",
      "format": "utc-millisec"
    },
    "signingTimeBounds": {
      "$ref": "#/definitions/dss2-SigningTimeInfoType%3ASigningTimeBoundaries"
    }
  },
  "required": ["signingTime"]
}

```

4.3.31.2 SigningTimeInfo – XML Syntax

« The XML type `SigningTimeInfoType` SHALL implement the requirements defined in the `SigningTimeInfo` component. » [XDSS-4.3.31.2-1]

The `SigningTimeInfoType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="SigningTimeInfoType">
  <xs:sequence>
    <xs:element name="SigningTime" type="xs:dateTime"/>
    <xs:element minOccurs="0" name="SigningTimeBoundaries">
      <xs:complexType>
        <xs:sequence>
          <xs:element minOccurs="0" name="LowerBoundary" type="xs:dateTime"/>
          <xs:element minOccurs="0" name="UpperBoundary" type="xs:dateTime"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

« Each child element of `SigningTimeInfoType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.31-2]

4.3.32 Component AugmentedSignature

The `AugmentedSignature` component contains the resulting augmented signature or timestamp or, in the case of a signature being enveloped in an output document, a pointer to the signature.

Below follows a list of the sub-components that MAY be present within this component:

- « The `SignatureObject` element MUST contain one instance of a sub-component. » [DSS-4.3.32-1]
- « This element MUST satisfy the requirements specified in this document in section 4.2.8 » [DSS-4.3.23-2]. This element contains an augmented signature or timestamp.
- « The optional `Type` element MUST contain one instance of a URI. » [DSS-4.3.32-3] The URI defines what 'augmentation' was applied to the signature.

4.3.32.1 AugmentedSignature – JSON Syntax

« The `AugmentedSignatureType` JSON object SHALL implement in JSON syntax the requirements defined in the `AugmentedSignature` component. » [JDSS-4.3.32.1-1]

« Properties of the JSON object SHALL implement the sub-components of `AugmentedSignature` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>SignatureObject</code>	<code>sigObj</code>
<code>Type</code>	<code>type</code>

» [JDSS-4.3.32.1-2]

The `AugmentedSignatureType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dss2-AugmentedSignatureType": {
  "type": "object",
  "properties": {
    "sigObj": {
      "$ref": "#/definitions/dss2-SignatureObjectType"
    },
    "type": {
      "type": "string",
      "format": "uri"
    }
  },
  "required": ["sigObj"]
}

```

4.3.32.2 AugmentedSignature – XML Syntax

« The XML type AugmentedSignatureType SHALL implement the requirements defined in the AugmentedSignature component. » [XDSS-4.3.32.2-1]

The AugmentedSignatureType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```

<xs:complexType name="AugmentedSignatureType">
  <xs:sequence>
    <xs:element name="SignatureObject" type="dss2:SignatureObjectType"/>
  </xs:sequence>
  <xs:attribute name="Type" type="xs:anyURI" use="optional"/>
</xs:complexType>

```

« Each child element of AugmentedSignatureType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.32.2-2]

4.3.33 Component ReturnTransformedDocument

The ReturnTransformedDocument component instructs the server to return an input document to which the XML signature transforms specified by a particular <ds:Reference> have been applied. The <ds:Reference> is indicated by the zero-based WhichReference attribute (0 means the first <ds:Reference> in the signature, 1 means the second, and so on). Multiple occurrences of this optional input can be present in a single verify request message. Each occurrence will generate a corresponding optional output.

Below follows a list of the sub-components that MAY be present within this component:

« The WhichReference element MUST contain one instance of an integer. » [DSS-4.3.33-1]
 To match outputs to inputs, each TransformedDocument will contain a WhichReference attribute which matches the corresponding optional input.

4.3.33.1 ReturnTransformedDocument – JSON Syntax

« The ReturnTransformedDocumentType JSON object SHALL implement in JSON syntax the requirements defined in the ReturnTransformedDocument component. » [JDSS-4.3.33.1-1]

« Properties of the JSON object SHALL implement the sub-components of ReturnTransformedDocument using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
---------	-------------------------------

WhichReference	whichRef
-----------------------	----------

» [JDSS-4.3.33.1-2]

The `ReturnTransformedDocumentType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-ReturnTransformedDocumentType": {
  "type": "object",
  "properties": {
    "whichRef": {
      "type": "integer"
    }
  },
  "required": ["whichRef"]
}
```

4.3.33.2 ReturnTransformedDocument – XML Syntax

« The XML type `ReturnTransformedDocumentType` SHALL implement the requirements defined in the `ReturnTransformedDocument` component. » [XDSS-4.3.33.2-1]

The `ReturnTransformedDocumentType` XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="ReturnTransformedDocumentType">
  <xs:attribute name="WhichReference" type="xs:integer" use="required"/>
</xs:complexType>
```

« Each child element of `ReturnTransformedDocumentType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.33.2-2]

4.3.34 Component TransformedDocument

The `TransformedDocument` component contains a document corresponding to the specified `<ds:Reference>`, after all the transforms in the reference have been applied.

Below follows a list of the sub-components that MAY be present within this component:

- « The `Document` element MUST contain one instance of a sub-component. » [DSS-4.3.34-1]
 - « This element MUST satisfy the requirements specified in this document in section 4.2.3. » [DSS-4.3.34-2] This element contains the transformed document.
 - « The `WhichReference` element MUST contain one instance of an integer. » [DSS-4.3.34-3]
- To match outputs to inputs, each `TransformedDocument` will contain a `WhichReference` element which matches the corresponding optional input.

4.3.34.1 TransformedDocument – JSON Syntax

« The `TransformedDocumentType` JSON object SHALL implement in JSON syntax the requirements defined in the `TransformedDocument` component. » [JDSS-4.3.34.1-1]

« Properties of the JSON object SHALL implement the sub-components of `TransformedDocument` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Document	doc

WhichReference	whichRef
-----------------------	----------

» [JDSS-4.3.34.1-2]

The TransformedDocumentType JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dss2-TransformedDocumentType": {
  "type": "object",
  "properties": {
    "doc": {
      "$ref": "#/definitions/dss2-DocumentType"
    },
    "whichRef": {
      "type": "integer"
    }
  },
  "required": ["doc", "whichRef"]
}
```

4.3.34.2 TransformedDocument – XML Syntax

« The XML type TransformedDocumentType SHALL implement the requirements defined in the TransformedDocument component. » [XDSS-4.3.34.2-1]

The TransformedDocumentType XML element is defined in XML Schema [DSS2XSD] and is provided below as a service to the reader.

```
<xs:complexType name="TransformedDocumentType">
  <xs:sequence>
    <xs:element name="Document" type="dss2:DocumentType"/>
  </xs:sequence>
  <xs:attribute name="WhichReference" type="xs:integer" use="required"/>
</xs:complexType>
```

« Each child element of TransformedDocumentType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.3.34.2-2]

4.4 Referenced Data Structure Models from other documents

4.4.1 Component NameID

The NameID component is used when an element serves to represent an entity by a string-valued name. This component reflects the structure 'NameID' defined in the SAML2 specification [SAML2RWXSD]. This section provides the definition required to support the DSS-X 2.0 multi-syntax approach.

Below follows a list of the sub-components that MAY be present within this component:

- « The value element MUST contain one instance of a string. » [DSS-4.4.1-1] In non-XML representations the value element contains the actual identifier
- « The optional Format element MUST contain one instance of a URI. » [DSS-4.4.1-2] The Format element represents the classification of string-based identifier information.
- « The optional SPProvidedID element MUST contain one instance of a string. » [DSS-4.4.1-3] The SPProvidedID element defines the alternative identifier of the principal most recently set by the service provider or affiliation, if any

« The optional `NameQualifier` element MUST contain one instance of a string. » [DSS-4.4.1-4] The `NameQualifier` element contains the security or administrative domain that qualifies the name. This attribute provides a means to federate names from disparate user stores without collision.

« The optional `SPNameQualifier` element MUST contain one instance of a string. » [DSS-4.4.1-5] The `SPNameQualifier` element further qualifies a name with the name of a service provider or affiliation of providers. This attribute provides an additional means to federate names on the basis of the relying party or parties.

4.4.1.1 NameID – JSON Syntax

« The `NameIDType` JSON object SHALL implement in JSON syntax the requirements defined in the `NameID` component. » [JDSS-4.4.1.1-1]

« Properties of the JSON object SHALL implement the sub-components of `NameID` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>value</code>	<code>value</code>
<code>Format</code>	<code>format</code>
<code>SPProvidedID</code>	<code>provId</code>
<code>NameQualifier</code>	<code>nameQual</code>
<code>SPNameQualifier</code>	<code>spNameQual</code>

» [JDSS-4.4.1.1-2]

The `NameIDType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"saml2rw-NameIDType": {
  "type": "object",
  "properties": {
    "spnameQualifier": {
      "type": "string"
    },
    "spprovidedID": {
      "type": "string"
    },
    "value": {
      "type": "string"
    },
    "format": {
      "type": "string"
    },
    "provId": {
      "type": "string"
    },
    "nameQual": {
      "type": "string"
    },
    "spNameQual": {
      "type": "string"
    }
  }
}

```

4.4.1.2 NameID – XML Syntax

The XML element is defined in the XML namespace:

<http://docs.oasis-open.org/dss-x/ns/saml2/rewritten>

« The XML type NameIDType SHALL implement the requirements defined in the NameID component. » [XDSS-4.4.1.2-1]

The NameIDType XML element is defined in XML Schema [SAML2RWXSD] and is provided below as a service to the reader.

```

<complexType name="NameIDType">
  <simpleContent>
    <extension base="string">
      <attributeGroup ref="saml2-rw:IDNameQualifiers"/>
      <xs:attribute name="Format" type="anyURI" use="optional"/>
      <xs:attribute name="SPProvidedID" type="string" use="optional"/>
    </extension>
  </simpleContent>
</complexType>

```

« Each child element of NameIDType XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.4.1.2-2] The element 'value' is represented by the component's XML tag text content.

4.4.2 Component Transforms

This component reflects the structure 'Transforms' defined in the XMLDSig specification [DSIGRWXSD]. This section provides the definition required to support the DSS-X 2.0 multi-syntax approach.

Below follows a list of the sub-components that MAY be present within this component:

« The `Transform` element MUST occur 1 or more times containing sub-component. » [DSS-4.4.2-1] « Each instance MUST satisfy the requirements specified in section 4.4.3. » [DSS-4.4.2-2]

4.4.2.1 Transforms – JSON Syntax

« The `TransformsType` JSON object SHALL implement in JSON syntax the requirements defined in the `Transforms` component. » [JDSS-4.4.2.1-1]

« Properties of the JSON object SHALL implement the sub-components of `Transforms` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
Transform	<code>transform</code>

» [JDSS-4.4.2.1-2]

The `TransformsType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```
"dsigrw-TransformsType": {
  "type": "object",
  "properties": {
    "transform": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsigrw-TransformType"
      }
    }
  },
  "required": ["transform"]
}
```

4.4.2.2 Transforms – XML Syntax

The XML element is defined in the XML namespace 'http://docs.oasis-open.org/dss-x/ns/xmldsig/rewritten'. « The XML type `TransformsType` SHALL implement the requirements defined in the `Transforms` component. » [XDSS-4.4.2.2-1]

The `TransformsType` XML element is defined in XML Schema [DSIGRWXSD] and is provided below as a service to the reader.

```
<complexType name="TransformsType">
  <sequence>
    <xs:element maxOccurs="unbounded" name="Transform"
      type="ds-rw:TransformType"/>
  </sequence>
</complexType>
```

« Each child element of `TransformsType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.4.2.2-2]

4.4.3 Component Transform

This component reflects the structure 'Transforms' defined in the XMLDSig specification [DSIGRWXSD]. This section provides the definition required to support the DSS-X 2.0 multi-syntax approach. See section 'Transforming DSS 1.0 into 2.0' for a detailed discussion of the applied changes.

Below follows a list of the sub-components that MAY be present within this component:

« The optional `value` element MUST contain a string. » [DSS-4.4.3-1] This string holds the text content part of a 'mixed' XML element.

« The optional `Base64Content` element MUST contain base64 encoded binary data. » [DSS-4.4.3-2]

The optional `XPath` element MAY occur zero or more times containing a string.

The optional `NsPrefixMapping` element MAY occur zero or more times containing sub-component. « If present each instance MUST satisfy the requirements specified in this document in section 4.1.1. » [DSS-4.4.3-3] This list has no direct correspondence in the XMLDSig schema definition. It is used to represent the XML namespace prefix definitions in other syntaxes than XML.

« The `Algorithm` element MUST contain one instance of a URI. » [DSS-4.4.3-4]

4.4.3.1 Transform – JSON Syntax

« The `TransformType` JSON object SHALL implement in JSON syntax the requirements defined in the `Transform` component. » [JDSS-4.4.3.1-1]

« Properties of the JSON object SHALL implement the sub-components of `Transform` using JSON-specific names mapped as shown in the table below.

Element	Implementing JSON member name
<code>value</code>	<code>val</code>
<code>Base64Content</code>	<code>b64Content</code>
<code>XPath</code>	<code>xPath</code>
<code>NsPrefixMapping</code>	<code>nsDecl</code>
<code>Algorithm</code>	<code>alg</code>

» [JDSS-4.4.3.1-2]

The `TransformType` JSON object is defined in the JSON schema [DSBJSON] and is provided below as a service to the reader.

```

"dsigrw-TransformType": {
  "type": "object",
  "properties": {
    "xpath": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "val": {
      "type": "string"
    },
    "b64Content": {
      "type": "string"
    },
    "XPath": {
      "type": "array",
      "items": {
        "type": "string"
      }
    },
    "nsDecl": {
      "type": "array",
      "items": {
        "$ref": "#/definitions/dsb-NsPrefixMappingType"
      }
    },
    "alg": {
      "type": "string"
    }
  },
  "required": ["alg"]
}

```

4.4.3.2 Transform – XML Syntax

The XML element is defined in the XML namespace:

<http://docs.oasis-open.org/dss-x/ns/xmldsig/rewritten>

The original definition of this element uses the 'mixed' content attribute. To support non-XML syntax using a common object model the attribute is dropped and a 'value' component is introduced. « The XML type TransformType SHALL implement the requirements defined in the Transform component. » [XDSS-4.4.3.2-1]

The TransformType XML element is defined in XML Schema [DSIGRWXSD] and is provided below as a service to the reader.

```

<xs:complexType name="TransformType">
  <xs:sequence>
    <xs:element maxOccurs="1" minOccurs="0" name="value" type="string"/>
    <xs:element maxOccurs="1" minOccurs="0" name="Base64Content"
      type="xs:base64Binary"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="XPath"
      type="string"/>
    <xs:element maxOccurs="unbounded" minOccurs="0" name="NsPrefixMapping"
      type="dsb:NsPrefixMappingType"/>
  </xs:sequence>
  <xs:attribute name="Algorithm" type="xs:anyURI" use="required"/>
</xs:complexType>

```

« Each child element of `TransformType` XML element SHALL implement in XML syntax the sub-component that has a name equal to its local name. » [XDSS-4.4.3.2-2]

4.5 Element / JSON Name Lookup Tables

4.5.1 JSON Member to Element Name

The subsequent table allows to find the names of a component's element for a given JSON member name.

Table 4.5.1: JSON member name to element name it was mapped from

JSON member name	mapped from element name
<code>additionalTimeInfo</code>	<code>AdditionalTimeInfo</code>
<code>addKeyInfo</code>	<code>AdditionalKeyInfo</code>
<code>alg</code>	<code>DigestMethod</code> <code>Algorithm</code>
<code>attRef</code>	<code>AttRef</code>
<code>attURI</code>	<code>AttRefURI</code>
<code>aud</code>	<code>IntendedAudience</code>
<code>augSig</code>	<code>AugmentedSignature</code>
<code>b64Content</code>	<code>Base64Content</code>
<code>b64Data</code>	<code>Base64Data</code>
<code>b64Sig</code>	<code>Base64Signature</code>
<code>cert</code>	<code>X509Certificate</code>
<code>claimedIdentity</code>	<code>ClaimedIdentity</code>
<code>code</code>	<code>Code</code>
<code>createEnvelopedSignature</code>	<code>CreateEnvelopedSignature</code>
<code>createRef</code>	<code>createReference</code>
<code>crl</code>	<code>X509CRL</code>
<code>currTime</code>	<code>CurrentTime</code>
<code>di</code>	<code>DigestInfo</code>
<code>dis</code>	<code>DigestInfos</code>
<code>doc</code>	<code>Document</code>

format	Format
hasObjectTagsAndAttributesSet	HasObjectTagsAndAttributesSet
ID	Id
id	Identifier
idRef	IdRef
incContent	IncludeEContent
incObj	IncludeObject
indeterminate	IndeterminateDetail
inDocs	InputDocuments
invalid	InvalidDetail
keySel	KeySelector
lowerBound	LowerBoundary
maj	ResultMajor
contentType	MimeType
min	ResultMinor
msg	ResultMessage Message
name	Name KeyName
nonce	Nonce
nsDecl	NsPrefixMapping
objId	ObjId
ocsp	OCSPResponse
optInp	OptionalInputs
optOutp	OptionalOutputs
poe	PoE
pre	NamespacePrefix
pRef	ProblemReference
procDetails	ProcessingDetails

profile	AppliedProfile
prop	Property
props	Properties
provId	SPProvidedID
quality	SignatureQualityLevel
recipient	Recipient
ref	Ref
refId	RefId
refType	RefType
refURI	RefURI
reqID	RequestID
respID	ResponseID
result	Result VerifyManifestResults ManifestResult
returnAugmented	ReturnAugmentedSignature
returnProcDetails	ReturnProcessingDetails
returnSigner	ReturnSignerIdentity
returnSigningTime	ReturnSigningTimeInfo
returnTimestamped	ReturnTimestampedSignature
returnTransformed	ReturnTransformedDocument
returnVerificationTime	ReturnVerificationTimeInfo
schema	Schema
schemaRefs	SchemaRefs
sigAlgo	SignatureAlgorithm
signedProps	SignedProperties
signedRef	SignedReference
signedRefs	SignedReferences
signerIdentity	SignerIdentity

signingTime	SigningTime
signingTimeBounds	SigningTimeBoundaries
signingTimeInfo	SigningTimeInfo
sigObj	SignatureObject
sigPlacement	SignaturePlacement
sigPtr	SignaturePtr
sigType	SignatureType
ski	X509SKI
specTime	SpecificTime
status	Status
sub	X509SubjectName
suppInfo	SupportingInfo
timestampedSig	TimestampedSignature
transform	Transform
transforms	Transforms
type	Type
unsignedProps	UnsignedProperties
upperBound	UpperBoundary
uri	NamespaceURI
useVerificationTime	UseVerificationTime
val	DigestValue Value value
valid	ValidDetail
verificationTime	VerificationTime
verificationTimeInfo	VerificationTimeInfo
verifyManifests	VerifyManifests
whichDoc	WhichDocument
whichRef	WhichReference

x509Digest	X509Digest
xPath	XPath ReferenceXpath
xPathAfter	XPathAfter
xPathFirstChildOf	XPathFirstChildOf

4.5.2 Element to Implementing JSON Member Name

The subsequent table allows to find the abbreviated JSON member names for a given element name.

Table 4.5.2: Element to abbreviated JSON member name it is mapped to

Element	Implementing JSON member name
AdditionalKeyInfo	addKeyInfo
AdditionalTimeInfo	additionalTimeInfo
Algorithm	alg
AppliedProfile	profile
AttRef	attRef
AttRefURI	attURI
AugmentedSignature	augSig
Base64Content	b64Content
Base64Data	b64Data
Base64Signature	b64Sig
ClaimedIdentity	claimedIdentity
Code	code
CreateEnvelopedSignature	createEnvelopedSignature
createReference	createRef
CurrentTime	currTime
DigestInfo	di
DigestInfos	dis
DigestMethod	alg
DigestValue	val
Document	doc
Format	format
HasObjectTagsAndAttributesSet	hasObjectTagsAndAttributesSet
Id	ID
Identifier	id

IdRef	idRef
IncludeEContent	incContent
IncludeObject	incObj
IndeterminateDetail	indeterminate
InputDocuments	inDocs
IntendedAudience	aud
InvalidDetail	invalid
KeyName	name
KeySelector	keySel
LowerBoundary	lowerBound
ManifestResult	result
Message	msg
MimeType	contentType
Name	name
NamespacePrefix	pre
NamespaceURI	uri
Nonce	nonce
NsPrefixMapping	nsDecl
ObjId	objId
OCSPPResponse	ocsp
OptionalInputs	optInp
OptionalOutputs	optOutp
PoE	poe
ProblemReference	pRef
ProcessingDetails	procDetails
Properties	props
Property	prop
Recipient	recipient
Ref	ref

ReferenceXPath	xPath
RefId	refId
RefType	refType
RefURI	refURI
RequestID	reqID
ResponseID	respID
Result	result
ResultMajor	maj
ResultMessage	msg
ResultMinor	min
ReturnAugmentedSignature	returnAugmented
ReturnProcessingDetails	returnProcDetails
ReturnSignerIdentity	returnSigner
ReturnSigningTimeInfo	returnSigningTime
ReturnTimestampedSignature	returnTimestamped
ReturnTransformedDocument	returnTransformed
ReturnVerificationTimeInfo	returnVerificationTime
Schema	schema
SchemaRefs	schemaRefs
SignatureAlgorithm	sigAlgo
SignatureObject	sigObj
SignaturePlacement	sigPlacement
SignaturePtr	sigPtr
SignatureQualityLevel	quality
SignatureType	sigType
SignedProperties	signedProps
SignedReference	signedRef
SignedReferences	signedRefs
SignerIdentity	signerIdentity

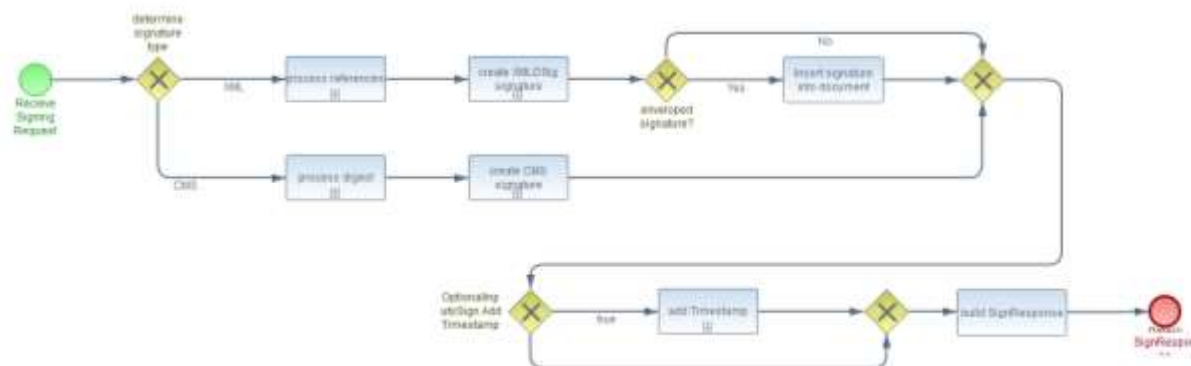
SigningTime	signingTime
SigningTimeBoundaries	signingTimeBounds
SigningTimeInfo	signingTimeInfo
SpecificTime	specTime
SPProvidedID	provId
Status	status
SupportingInfo	suppInfo
TimestampedSignature	timestampedSig
Transform	transform
Transforms	transforms
Type	type
UnsignedProperties	unsignedProps
UpperBoundary	upperBound
UseVerificationTime	useVerificationTime
ValidDetail	valid
Value	val
value	val
VerificationTime	verificationTime
VerificationTimeInfo	verificationTimeInfo
VerifyManifestResults	result
VerifyManifests	verifyManifests
WhichDocument	whichDoc
WhichReference	whichRef
X509Certificate	cert
X509CRL	crl
X509Digest	x509Digest
X509SKI	ski
X509SubjectName	sub
XPath	xPath

XPathAfter	xPathAfter
XPathFirstChildOf	xPathFirstChildOf

5 Data Processing Model for Signing

The following process diagram illustrates the major building blocks of the processing of a signing request. The sub processes are described in the next chapters.

Figure 2: Signing Overview



The workflow splits into the sections for XMLDSig and CMS signature processing. The input component for a signing request is `SignRequest` (see section 4.2.6). The signature will be selected by the server considering a given `SignatureType` element of `OptionalInputsSign` and its configuration and policies. « Profiles MAY introduce additional signature types and thus MUST define the adequate processing steps. » [DSS-5-1]

If the element `AddTimestamp` of `OptionalInputsSign` is set to 'true' the sub-process 'add Timestamp' adds a timestamp to the signature.

The task of building the `SignResponse` component is shared between all signature formats.

5.1 Processing for XML Signatures

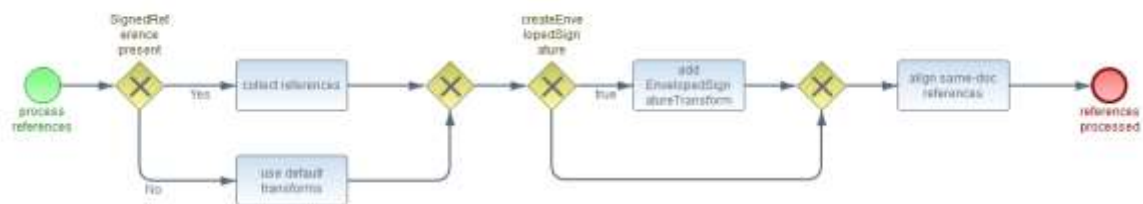
The first sub-process 'process references' of the XML signature creation is the processing of the references. The second sub-process handles the creation of the XML signature. These two sub-processes are described in detail below.

If the element `CreateEnvelopedSignature` of `SignaturePlacement` is set to `true` the signature will be inserted into the document and location selected by `SignaturePlacement`.

5.1.1 Sub process 'process references'

The following process diagram illustrates the processing steps for the assembly of references.

Figure 3: Process References



The input documents are read from the `Base64Data` element of the referred `Document` component into an octet stream. « This data MUST be a well-formed XML Document as defined in [XML] section 2.1. » [DSS-5.1.1-1]

If the optional input `SignedReferences` is present each `SignedReference` element controls the creation of a corresponding `<ds:Reference>`. The task ‘collect references’ handles the `SignedReferences`.

Otherwise there will be a `<ds:Reference>` element for each given input document. The set of transforms and their parameter will be selected by the server. The task ‘use default transforms’ select this set of `<ds:Reference>`.

Note: Transforms can be applied as a server implementation MAY choose to increase robustness of the Signatures created. These Transforms may reflect idiosyncrasies of different parsers or solve encoding issues or the like. Servers MAY choose not to apply transforms in basic processing and extract the binary data for direct hashing or canonicalize the data directly if certain optional inputs are not to be implemented.

If the element `CreateEnvelopedSignature` of `SignaturePlacement` is set to `true` the list of transforms will be prepended with an `EnvelopedSignatureTransform` entry. The task ‘add EnvelopedSignatureTransform’ processes the corresponding `<ds:Reference>`.

« The `RefURI` attribute of `<ds:Reference>` element MUST be set to include a “same-document” URI which references either:

- The whole `Document` containing the signature (by using a `RefURI=""`)
- The relevant parts of the `Document` to be covered/protected by the signature (by using a “same-document” `RefURI` attribute having a value starting with “#”, like `RefURI="#some-id"`, `RefURI="#xpointer(/)"`, `RefURI="#xpointer(/DocumentElement/ToBeSignedElement)"` or the like).

If the result of evaluating the expression included in the `RefURI` attribute doesn’t fit in any of the options described above, the server MUST reject the request using a `ResultMajor RequesterError` which MAY be qualified by a `ResultMinor urn:oasis:names:tc:dss:1.0:resultminor:InvalidRefURI`.

» [DSS-5.1.1-2]

This alignment will be performed by the task ‘align same-doc references’.

5.1.2 Sub process ‘create XML signature’

Figure 4: Create XML Signature



The first task ('calculate remaining transforms') of this section applies the given set of transforms. If a `TransformedData` element is provided by the client these calculations **MUST** be respected and just the remaining set of transforms must be processed by the server. « The case of a `Document` as base for a reference processing all transform steps **MUST** be applied. » [DSS-5.1.2-1]

Note: « As required in [XMLDSIG] if the end result is an XML node set, the server **MUST** attempt to convert the node set back into an octet stream using Canonical XML [XML-C14N]. » [DSS-5.1.2-2]

The 'calculate / use given hash' task computes the digest upon the transformation output. If a `DocumentHash` element is provided by the client the hash values are used as input for the following steps. The `DocumentHash` **MAY** contain digests of different algorithms. The server selects the appropriate hash algorithm.

Performing the task 'build XMLDSig' the server forms a set of `<ds:Reference>` with the elements and attributes set as follows:

- If the `Document` has a `RefURI` attribute, the `<ds:Reference>` element's `URI` attribute is set to the value of the `RefURI` attribute, else this attribute is omitted.
« A signature **MUST NOT** be created if more than one `RefURI` is omitted in the set of input documents and the server **MUST** report a `RequesterError` by setting `ResultMajor` `RequesterError` qualified by a `ResultMinor`. » [DSS-5.1.2-3]
- If the `Document` has a `RefType` attribute, the `<ds:Reference>` element's `Type` attribute is set to the value of the `RefType` attribute, else this attribute is omitted.
- The `<ds:DigestMethod>` element is set to the hash method used.
- The `<ds:DigestValue>` element is set to the hash value that is to be calculated as per [XMLDSIG].
- The `<ds:Transforms>` element is set to the sequence of transforms applied by the server in step b. « This sequence **MUST** describe the effective transform as a reproducible procedure from parsing until hash. » [DSS-5.1.2-4]
- « References resulting from processing of optional inputs **MUST** be included. » [DSS-5.1.2-5] In doing so, the server **MAY** reflect the ordering of the `Document` elements.

The server creates an XML signature using these `<ds:Reference>` elements according to the processing rules in [XMLDSIG].

The last task 'insert ds:Object' handles the creation of an enveloping signature. If one or more optional input elements `IncludeObject` are present they will cause the inclusion of an object inside the signature being created.

5.1.2.1 XML Signatures Variant Optional Input `IncludeObject`

An enveloping signature is a signature having `<ds:Object>`s which are referenced by `<ds:Reference>`s having a same-document URI.

For each `<IncludeObject>` the server creates a new `<ds:Object>` element containing the document, as identified using the `WhichDocument` element, as its child. This object is carried within the enveloping signature. The ordering of the `<IncludeObject>` optional inputs **MAY** be ignored by the server.

« This `<Document>` MUST include a “same-document” `RefURI` attribute (having a value starting with “#”) which references either:

- The whole newly-created `<ds:Object>`.
- The relevant parts of the newly-created `<ds:Object>`’s contents to be covered/protected by the signature.

» [DSS-5.1.2.1-1] « If the result of evaluating the expression included in the `RefURI` element doesn’t fit in any of the options described above, the server MUST reject the request using a `ResultMajorRequesterError` which MAY be qualified by a `ResultMinor`
`urn:oasis:names:tc:dss:1.0:resultminor:InvalidRefURI` » [DSS-5.1.2.1-2]

Note: If the server does not support the ordering of `<ds:Object>`, it is recommended either to use ID-based referencing to the `<ds:Object>` (using the client-generated ID included in the `ObjId` attribute) or to rely on expressions based on `<ds:Object>`’s contents that allow to unambiguously refer to the included object or their relevant parts.

The URI in the `RefURI` element of this `<Document>` should at least reference the relevant parts of the Object to be included in the calculation for the corresponding reference. « Clients MUST generate requests in a way that some `<ds:Reference>`’s URI values actually will reference the `<ds:Object>` generated by the server once this element will have been included in the `<ds:Signature>` produced by the server. » [DSS-5.1.2.1-3]

« For each `IncludeObject` the server MUST carry out the following steps before performing Basic Processing:

1. The server identifies the `Document` that is to be placed into a `<ds:Object>` as indicated by the `WhichDocument` element.
2. The data to be carried in the enveloping signature is extracted and decoded.
3. If the `hasObjectTagsAndAttributesSet` element is `false` or not present the server builds the `<ds:Object>` as follows:
 - a. The server generates the new `<ds:Object>` and sets its `Id` attribute to the value indicated in `ObjId` element of the optional input if present.
 - b. In the case of the `Document` pointed at by `WhichDocument` having `Base64Data`, `<ds:Object>`’s MIME Type is to be set to the value of `Base64Data('s)` MIME Type value and the `Encoding` is to be set to <http://www.w3.org/TR/xmlschema-2/#base64Binary>
4. The server splices the to-be-enveloped documents as `<ds:Object>(s)` into the `<ds:Signature>`, which is to be returned.
5. If `CreateReference` is set to `true` generate a `ds:Reference` element referencing the spliced `<ds:Object>` and exclude this `<Document>` from the set of `<Document>s` ready for further processing. Otherwise just exclude this `<Document>` from the set of `<Document>s` ready for further processing.

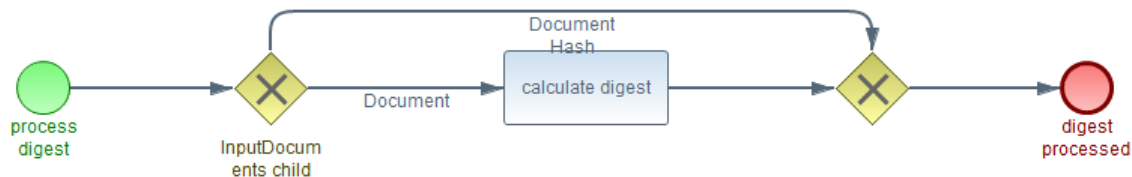
» [DSS-5.1.2.1-4]

5.2 Processing for CMS Signatures

5.2.1 Sub process ‘process digest’

The following process diagram illustrates the processing steps required to calculate the digest for a CMS signature.

Figure 5: Process Digest

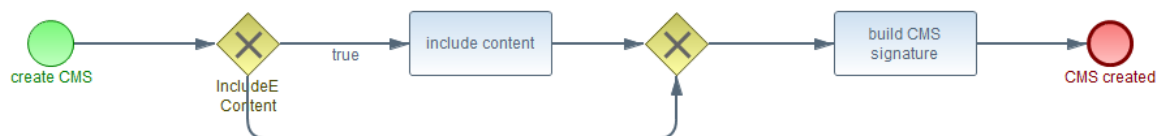


The `SignRequest` component **MUST** contain either a single `Document` (not having `RefURI` or `RefType` set) or a single `DocumentHash` component not having `RefURI`, `RefType`, `Transforms`. If the `InputDocuments` component contains a `Document` element, the server hashes the octet stream represented by the `Document`. This is performed by the task 'calculate digest'. If the `InputDocuments` component contains a `DocumentHash` element, the server uses the hash values as an input for the following steps. The `DocumentHash` **MAY** contain digests of different algorithms. The server selects the appropriate hash algorithm.

5.2.2 Sub process 'create CMS signature'

The following process diagram illustrates the processing steps to create a CMS signature.

Figure 6: Create CMS signature



If the `InputDocuments` component contains a `Document` element and the `IncludeEContent` element of the `OptionalInputsSign` component is set to `true` then the task 'include content' creates a CMS structure with the document enveloped within the signature. For CMS details in this context please refer to [RFC 3852] sections 5.1 "SignedData Type" and 5.2 "EncapsulatedContentInfo Type".

« Otherwise the resulting signature **MUST** be detached (aka. external or "without eContent"). » [DSS-5.2.2-1]

The following task 'build CMS signature' builds a `SignedData` structure containing the `SignerInfo` computed as follows:

The server forms a `SignerInfo` structure based on the input document. The components of the `SignerInfo` are set as follows:

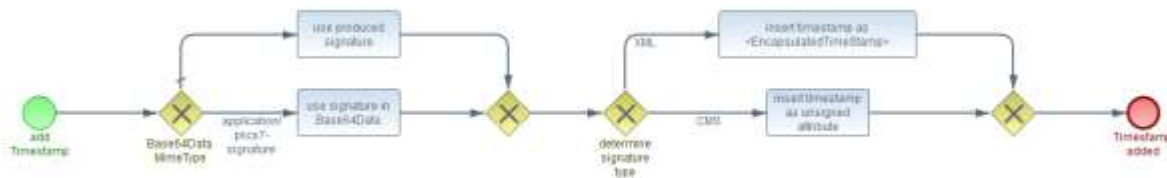
- The `digestAlgorithm` field is set to the OID value for the hash method that was used in the previous processing step.
- The `signedAttributes` field's message-digest attribute contains the hash value that was calculated / provided in previous processing step. Other `signedAttributes` **MAY** be added by the server, according to its profile or policy, or according to the `Properties` optional input.
- The remaining fields (`sid`, `signatureAlgorithm`, and `signature`) are filled in as per a normal CMS signature.

5.3 General Timestamp Processing

5.3.1 Sub process 'add Timestamp'

The following process diagram illustrates the processing steps to insert a timestamp.

Figure 7: Add Timestamp



The `AddTimestamp` element of `OptionalInputsSign` indicates that the client wishes the server to embed a timestamp token as a property or attribute of the resultant or the supplied signature. The timestamp token will be applied to the signature value in the case of CMS/PKCS7 signatures or the `<ds:SignatureValue>` element in the case of XML signatures.

Note: Procedures for handling other forms of timestamp may be defined in profiles of the Core. In particular, the DSS AdES profile [DSS-AdES-P] defines procedures for generating timestamps over the content which is about to be signed (sometimes called content timestamps), and the DSS Timestamp profile [DSS-TS-P] defines procedures for handling standalone timestamps.

The `Type` element, if present, indicates what type of timestamp to apply. « Profiles that use this optional input MUST define the allowed values, and the default value, for the `Type` attribute (unless only a single type of timestamp is supported, in which case the `Type` attribute can be omitted). » [DSS-5.3.1-1]

Two scenarios for the timestamping of both CMS and XML signatures are supported by this Optional Input. They are as follows:

- Create and embed a timestamp token into the signature being created as part of this `SignRequest`.
- Create and embed a timestamp token into an existing signature, without verification, which is passed in the `InputDocuments` element of this `SignRequest`.

The following subsections specify the use of RFC 3161 timestamps with CMS signatures and the use of XML Timestamps or RFC 3161 timestamps with XML Signature. These subsections address both scenarios.

Note: The server SHOULD not verify the incoming signature before adding the timestamp. If a client wishes that its signatures be verified as a condition of time stamping, the client SHOULD use the `AddTimestamp` optional input of the `Verify` protocol.

5.3.1.1 Processing for CMS signatures time-stamping

If the `MimeType` element of the `Base64Data` component is set to `'application/pkcs7-signature'` a timestamp token is created and embedded into the existing signature, without verification, which is passed in the `InputDocuments` component of this `SignRequest`. Otherwise a timestamp token is created and embedded into the signature being created as part of the processing of this `SignRequest`.

« In both scenarios, the timestamp token created by the server SHALL be created according to [RFC 3161]. » [DSS-5.3.1.1-1] The `MessageImprint` field within the `TstInfo` structure of the timestamp token will be derived from the signature value of the just-created or incoming signature depending on the scenario. « The timestamp SHALL be embedded in the CMS signature as an unsigned attribute with the object identifier (see Appendix A of [RFC 3161]):

```
{ iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-9(9) smime(16)
id-aa(2) 14} » [DSS-5.3.1.1-2]
```

The signature and its embedded timestamp is returned in the `SignatureObject` element of the `SignResponse` component.

5.3.1.2 Processing for XML Timestamps on XML signatures

« If the type attribute in the optional input `AddTimestamp` is

`urn:oasis:names:tc:dss:1.0:core:schema:XMLTimeStampToken`

and signature being timestamped is an XML signature, then the XML signature MUST contain `<dss:timestamp>` as defined in [DSS1Core] section 5.1, placed in a `<xades:XMLTimeStamp>` within a `<xades:SignatureTimeStamp>` as defined in [XAdES]. » [DSS-5.3.1.2-1]

« The `<dss:timestamp>` MUST contain `<ds:Signature>` with at least two `<ds:Reference>` elements:

- One with the `Type` attribute set to `urn:oasis:names:tc:dss:1.0:core:schema:XMLTimeStampToken` and referencing a `<ds:Object>` element whose content is a `<TSTInfo>` element.
- The other referencing the `<ds:SignatureValue>` being timestamped.

» [DSS-5.3.1.2-2]

The present specification defines a format for XML timestamp tokens. In addition, XAdES defines a mechanism for incorporating signature timestamps in XML signatures. « The present document mandates that signature timestamps in XML format MUST follow the syntax defined in [DSS1Core] section 5.1. » [DSS-5.3.1.2-3] « These time-stamp tokens MUST be added to XML signatures as specified by XAdES. » [DSS-5.3.1.2-4]

« The signature and its embedded timestamp SHALL be returned in the `<SignatureObject>` of the `<SignResponse>`. » [DSS-5.3.1.2-5]

5.3.1.3 Processing for RFC 3161 Timestamps on XML signatures

« If the type attribute in this optional input `AddTimestamp` is

`urn:ietf:rfc:3161`

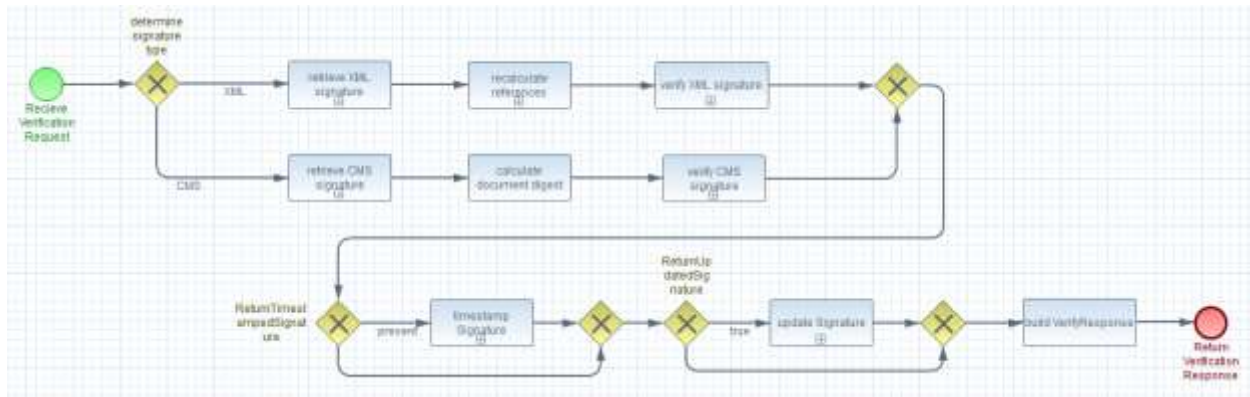
and signature being timestamped is an XML signature then the XML signature MUST contain an RFC 3161, placed in a `<xades:EncapsulatedTimeStamp>` within a `<xades:SignatureTimeStamp>` as defined in [XAdES]. » [DSS-5.3.1.3-1]

6 Data Processing Model for Verification

A DSS server that verifies XML signatures SHOULD perform the following steps, upon receiving a verification with the top-level component `VerifyRequest` (see section 4.2.10). These steps may be changed or overridden by the optional inputs, or by the profile or policy the server is operating under. The results of the verification process are return to the caller within a `VerifyResponse` component (see section 4.2.11). For more details on multi-signature verification, see section 6.1.1.1 [Multi-Signature Verification](#).

The following process diagram illustrates the major buildings blocks of the processing of a verification request. The sub processes are described in the following sub-chapters.

Figure 8: Verification Overview



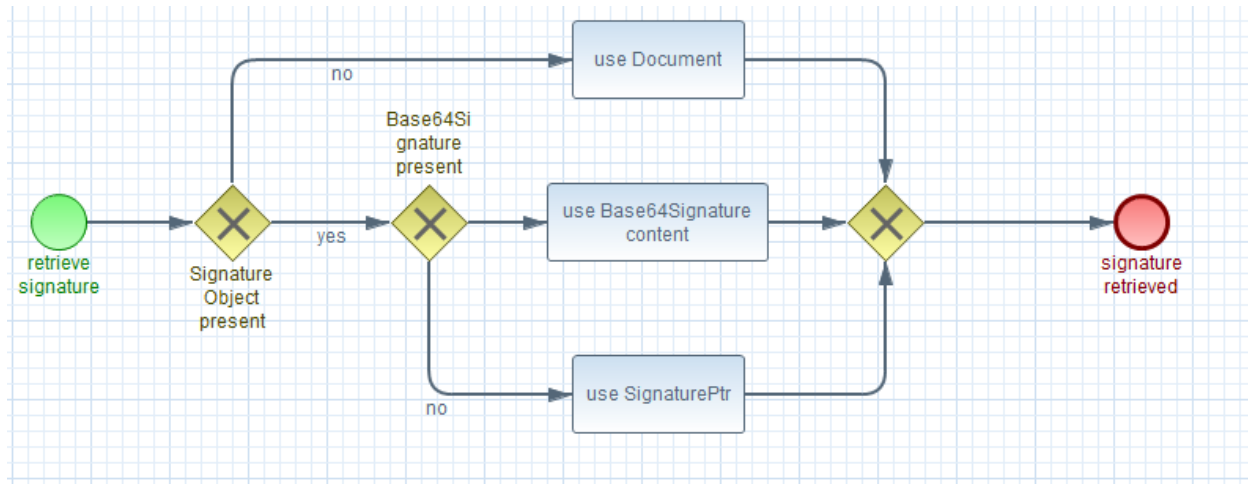
The workflow splits into the sections for XMLDSig and CMS signature processing. « The processing path will be selected by the server considering a given `SignatureType` element of `OptionalInputsVerify` and its configuration and policies. » [DSS-6-1] Profiles may introduce additional signature types and MUST define the adequate processing steps.

- If the element `ReturnTimestampedSignature` of `OptionalInputsVerify` is present, the sub-process 'timestamp Signature' adds a timestamp to the signature.
- If the element `ReturnUpdatedSignature` of `OptionalInputsVerify` is 'true' the sub-process 'update Signature' inserts the updated signature into the `OptionalOutputsVerify`.

6.1 Processing for XML Signature Verification

6.1.1 Sub process 'retrieve XML signature'

Figure 9: Retrieve XML Signature



The server retrieves one or more `<ds:Signature>` objects as follows:

- If the `SignatureObject` is present, the server retrieves either the `<ds:Signature>` that is a child element of the `SignatureObject` (see: Note at the end of this section), or those `<ds:Signature>` objects which are pointed to by the `SignaturePtr` in the `SignatureObject`.
- If the `SignaturePtr` points to an input document but not a specific element in that document, the pointed-to input document must be a `Document` element containing XML.
- « If the `SignatureObject` is omitted, there MUST be only a single `Document` element. » [DSS-6.1.1-1] This case is handled as if a `SignaturePtr` pointing to the single `Document` was present: the server will search and find every `<ds:Signature>` element in this input document and verify each `<ds:Signature>` according to the steps below.

6.1.1.1 Multi-Signature Verification

« If a client requests verification of an entire input document, either using a `SignaturePtr` without an XPath or a missing `SignaturePtr` (see section 6.1 step 1), then the server MUST determine whether the input document contains zero, one, or more than one `<ds:Signature>` elements. » [DSS-6.1.1.1-1] If zero, the server SHOULD return a `ResultMajor` code of `RequesterError`.

« If more than one `<ds:Signature>` elements are present, the server MUST either reject the request with a `ResultMajor` code of `RequesterError` and a `ResultMinor` code of `NotSupported`, or accept the request and try to verify all of the signatures. » [DSS-6.1.1.1-2]

If the server accepts the request in the multi-signature case (or if only a single signature is present) and one of the signatures fails to verify, the server should return one of the error codes in section 6.2, reflecting the first error encountered.

If all of the signatures verify correctly, the server should return the `Success ResultMajor` code and the following `ResultMinor` code:

`urn:oasis:names:tc:dss:1.0:resultminor:ValidMultiSignatures`

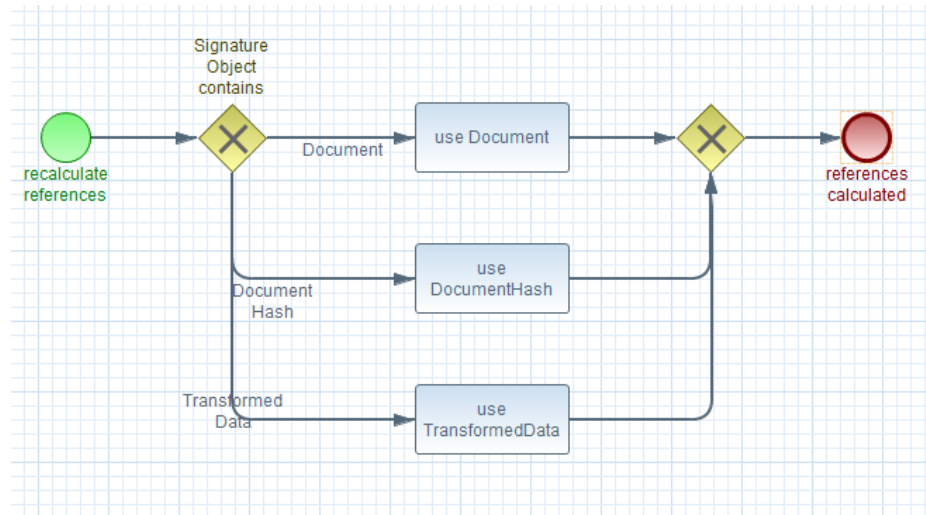
Non-normative Note:

These procedures only define procedures for handling of multiple signatures on one input document. The procedures for handling multiple signatures on multiple documents are not defined in this core specification, but however such procedures, along with any optional elements that may be required, may be defined in profiles of this specification.

Only certain optional inputs and outputs are allowed when performing multi-signature verification. See section 5.3 [General processing](#) for details.

6.1.2 Sub process 'recalculate references'

Figure 10: Recalculate References



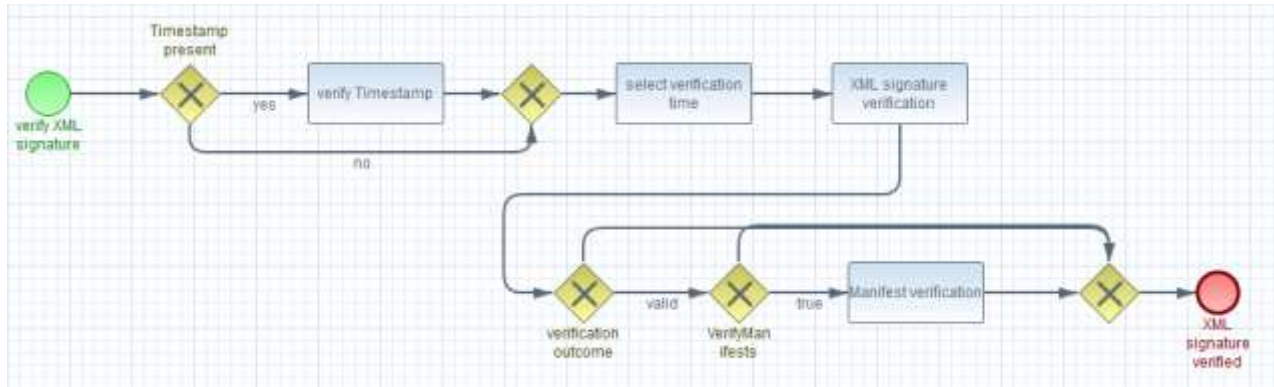
For each `<ds:Reference>` in the `<ds:Signature>`, the server finds the input document with matching RefURI and RefType values (omitted attributes match omitted attributes).

- If the `<ds:Reference>` uses a same-document URI, the XPointer should be evaluated against the input document the `<ds:Signature>` is contained within, or against the `<ds:Signature>` itself if it is contained within the `SignatureObject` element.
- The `SchemaRef` element or optional input `Schema` of the input document or `SignatureObject` will be used, if present, to identify ID attributes when evaluating the XPointer expression.
- If the `<ds:Reference>` uses an external URI and the corresponding input document is not present, the server will skip the `<ds:Reference>`, and later return a result code such as `ReferencedDocumentNotPresent` to indicate this. The RefURI MAY be omitted in at most one of the set of input documents.
- If the input document is a `Document`, the server extracts and decodes as described in 4.2.3 [Component Document](#) onwards depending of the form of the input document).
- If the input document is a `TransformedData`, the server MAY check that the `<ds:Transforms>` (if supplied) match between the `TransformedData` and the `<ds:Reference>` and then hashes the resultant data object according to `<ds:DigestMethod>`. « The server MUST check that the result matches `<ds:DigestValue>`. » [DSS-6.1.2-1]
- If the input document is a `DocumentHash`, the server MAY check that the `<ds:Transforms>`, `<ds:DigestMethod>` (if supplied) and `<ds:DigestValue>` elements match between the `DocumentHash` and the `<ds:Reference>`.
- « If the combination of RefURI and RefType matches more than one input document all of them MUST be either a `TransformedData` or a `DocumentHash` otherwise a `RequesterError` is issued qualified by result minor of `ReferencedDocumentNotPresent`. » [DSS-6.1.2-2]
Only one of them is allowed to have a `WhichReference` value that matches the order of the

<ds:Reference> within the <ds:SignedInfo> in question otherwise a RequesterError is issued qualified by result minor of ReferencedDocumentNotPresent.

6.1.3 Sub process 'verify XML signature'

Figure 11: Verify XML Signature



« If one or more timestamps are present on the given signature this / these timestamps MUST be verified. » [DSS-6.1.3-1] The 'time of existence' asserted by the timestamp MAY be used to decide the verification time. For details see section 6.1.3.1 and 6.1.3.2 .

The server verifies the validity of the signature at a particular time (i.e. current time, assumed signing time or other time), depending on the server policy. This behavior MAY be altered by using the optional input UseVerificationTime.

If the VerifyManifests element of OptionalInputsVerify is set to 'true' the server validates the manifests in an XML signature. In accordance with [XMLDSIG] section 5.1, DSS Manifest validation does not affect a signature's core validation. The results of verifying individual <ds:Reference>'s within a <ds:Manifest> are returned in the VerifyManifestResults within the OptionalOutputsVerify. If the optional input VerifyManifests is set to 'true' and the XMLSig core validation succeeds, then the returned ResultMinor is

urn:oasis:names:tc:dss:1.0:resultminor:valid:hasManifestResults

In case of a negative XMLSig core validation no attempt is made to verify manifests.

If the signature validates correctly, the server returns one of the first three ResultMinor codes listed in section 6.2, depending on the relationship of the signature to the input documents (not including the relationship of the signature to those XML elements that were resolved through XPointer evaluation; the client will have to inspect those relationships manually). If the signature fails to validate correctly, the server returns some other code; either one defined in section 6.2 of this specification, or one defined by some profile of this specification.

6.1.3.1 Processing for RFC 3161 timestamp tokens on XML Signatures

The present section describes the processing rules for verifying an RFC 3161 timestamp token embedded within an XML signature as an unsigned property. This XML signature may be passed in on a Verify call within the SignatureObject or embedded within a Document's child.

The server shall verify the timestamp token performing the steps detailed below. If any one of them results in failure, then the timestamp token SHOULD be rejected.

1. Extract the timestamp token embedded in the incoming signature as defined in 5.3.1.2 [Processing for XML Timestamps on XML signatures](#).
2. Verify that the token's public verification certificate is authorized for time stamping by examining the Extended Key Usage field for the presence of the time stamping OID "1.3.6.1.5.5.7.3.8".
3. Process the signature timestamp as defined in [XAdES] Annex G.2.2.16.1.3.

4. Verify that the public verification certificate conforms to all relevant aspects of the relying-party's policy including algorithm usage, policy OIDs, time accuracy tolerances, and the Nonce value.
5. Set the `Result` element as appropriate.
`urn:oasis:names:tc:dss:1.0:resultminor:valid:signature:InvalidSignatureTimestamp` MAY be used to indicate that the signature is valid but the timestamp against that signature is invalid.

6.1.3.2 Processing for XML timestamp tokens on XML signatures

The present section describes the processing rules for verifying and XML Signature timestamp token embedded within an XML signature using the incorporation mechanisms specified in XAdES (i.e., in the `<xades:XMLTimeStamp>` `<xades:SignatureTimeStamp>` element's child). This XML signature may be passed in on a `Verify` call within the `SignatureObject` or embedded within a `Document`'s child.

The server shall verify the timestamp token performing the steps detailed below. If any one of them results in failure, then the timestamp token SHOULD be rejected.

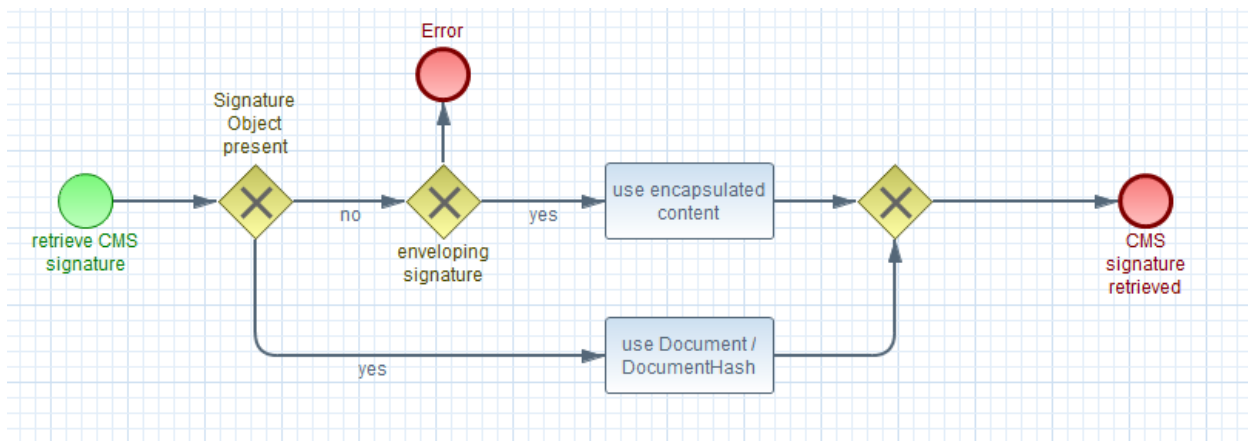
1. Extract the timestamp token embedded in the incoming signature as defined in 5.3.1.2 [Processing for XML Timestamps on XML signatures](#).
2. Verify that the verification key and algorithms used conforms to all relevant aspects of the applicable policy. Should this key come within a public certificate, verify that the certificate conforms to all relevant aspects of the applicable policy including algorithm usage, policy OIDs, and time accuracy tolerances.
3. Verify that the aforementioned verification key is consistent with the `ds:SignedInfo/SignatureMethod/@Algorithm` attribute value.
4. Verify the timestamp token signature in accordance with the rules defined in **[XMLDSIG]**.
5. Verify that the `<ds:SignedInfo>` element contains at least two `<ds:Reference>` elements.
6. Verify that one of the `<ds:Reference>` elements has its `Type` attribute set to `"urn:oasis:names:tc:dss:1.0:core:schema:XMLTimeStampToken"`.
Take this one and proceed as indicated below:
 - a. Retrieve the referenced data object. Verify that it references a `<ds:Object>` element, which in turn envelopes a `<TSTInfo>` element.
 - b. Verify that the `<TSTInfo>` element has a valid layout as per the present specification.
 - c. Extract the digest value and associated algorithm from its `<ds:DigestValue>` and `<ds:DigestMethod>` elements respectively.
 - d. Recalculate the digest of the retrieved data object as specified by **[XMLDSIG]** with the digest algorithm indicated in `<ds:DigestMethod>`, and compare this result with the contents of `<ds:DigestValue>`.
7. Take each of the other `<ds:Reference>` elements and for each validate the hash as specified in **[XMLDSIG]**.
8. Check that for one of the `<ds:Reference>` elements the retrieved data object is actually the `<ds:SignatureValue>` element and that it contains its digest after canonicalization.
9. Set the `Result` element as appropriate. Minor Error
`urn:oasis:names:tc:dss:1.0:resultminor:valid:signature:InvalidSignatureTimestamp` MAY be used to indicate that the signature is valid but the timestamp against that signature is invalid.

6.2 Processing for CMS Signature Verification

A DSS server that verifies CMS signatures SHOULD perform the following steps, upon receiving a `VerifyRequest`. These steps may be changed or overridden by the optional inputs, or by the profile or policy the server is operating under.

6.2.1 Sub process 'retrieve CMS signature'

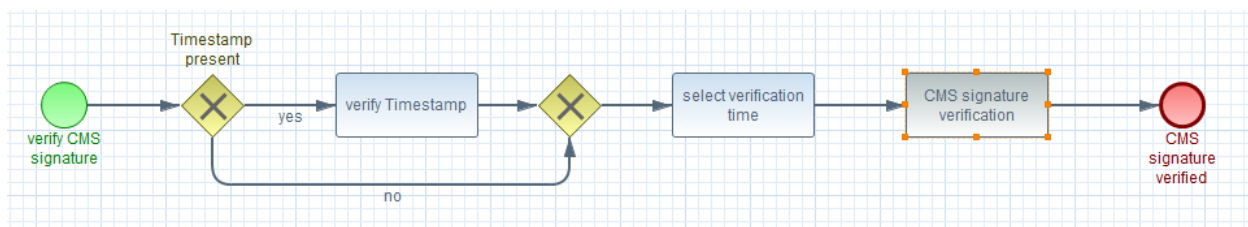
Figure 12: Retrieve CMS Signature



1. The server retrieves the CMS signature by decoding the `Base64Signature` child of `SignatureObject`.
2. The server retrieves the input data. « If the CMS signature is detached, there MUST be a single input document: i.e. a single `Document` or `DocumentHash` element. » [DSS-6.2.1-1] « Otherwise, if the CMS signature is enveloping, it contains its own input data and there MUST NOT be any input documents present. » [DSS-6.2.1-2]
3. The CMS signature and input data are verified in the conventional way (see [RFC 5652] for details).
4. If the signature validates correctly, the server returns the first `ResultMinor` code listed in section 6.2. If the signature fails to validate correctly, the server returns some other code; either one defined in section 6.2 of this specification, or one defined by some profile of this specification.

6.2.2 Sub process 'verify CMS signature'

Figure 13: Verify CMS Signature



« If one or more timestamps are present on the given signature this / these timestamps MUST be verified. » [DSS-6.2.2-1] The 'time of existence' asserted by the timestamp MAY be used to decide the verification time. For details see section 6.2.2.1 .

The server verifies the validity of the signature at a particular time (i.e. current time, assumed signing time or other time), depending on the server policy. This behavior MAY be altered by using the optional input `UseVerificationTime`.

If the signature validates correctly, the server returns one of the first three `ResultMinor` codes listed in section 4.1.7 [Component Result](#). If the signature fails to validate correctly, the server returns some other code; either one defined in section 4.1.7 [Component Result](#) of this specification, or one defined by some profile of this specification.

6.2.2.1 Processing for RFC 3161 Timestamp tokens on CMS Signatures.

The present section describes the processing rules for verifying a CMS RFC3161 timestamp token passed in on a Verify call within the `SignatureObject` of the `VerifyRequest` element. In the CMS case, since the "signature timestamp" is embedded in the signature as an unsigned attribute, only the time stamped signature is required for verification processing. As such, no additional input is required.

The processing by the server is broken down into the following steps:

1. The signature timestamp is embedded in the incoming signature as an unsigned attribute whose object identifier is 1.2.840.11359.1.9.16.2.14. Extract and verify the timestamp token.
2. Verify that the token's public verification certificate is authorized for time stamping by examining the Extended Key Usage field for the presence of the time stamping OID "1.3.6.1.5.5.7.3.8".
3. Validate that the `TstInfo` structure has a valid layout as defined in **[RFC 3161]**.
4. Extract the `MessageImprint` hash value and associated algorithm from the `TstInfo` structure which will be compared against the hash value derived in the next step.
5. Recalculate the hash of the signature value field of the signature in which the timestamp is embedded.
6. Compare the hash values from the two previous steps, and if they are equivalent, then this timestamp is valid for the signature that was time stamped.
7. Verify that the public verification certificate conforms to all relevant aspects of the relying-party's policy including algorithm usage, policy OIDs, time accuracy tolerances, and the Nonce value.
8. Set the `Result` element as defined in this specification. Minor Error
`urn:oasis:names:tc:dss:1.0:resultminor:valid:signature:InvalidSignatureTimestamp` MAY be used to indicate that the signature is valid but the timestamp against that signature is invalid.

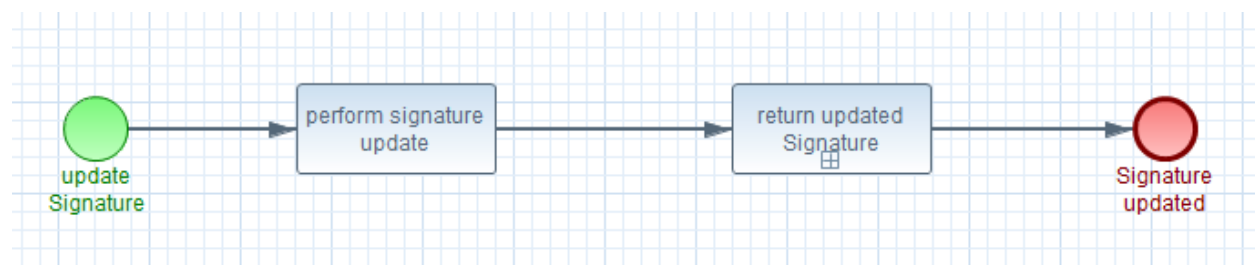
6.3 General Processing

The following steps are shared between all signature types.

6.3.1 Sub process 'update Signature'

The presence of the `ReturnUpdatedSignature` element of `OptionalInputsVerify` instructs the server to return an `UpdatedSignature` output, containing a new or updated signature.

Figure 14: Update Signature



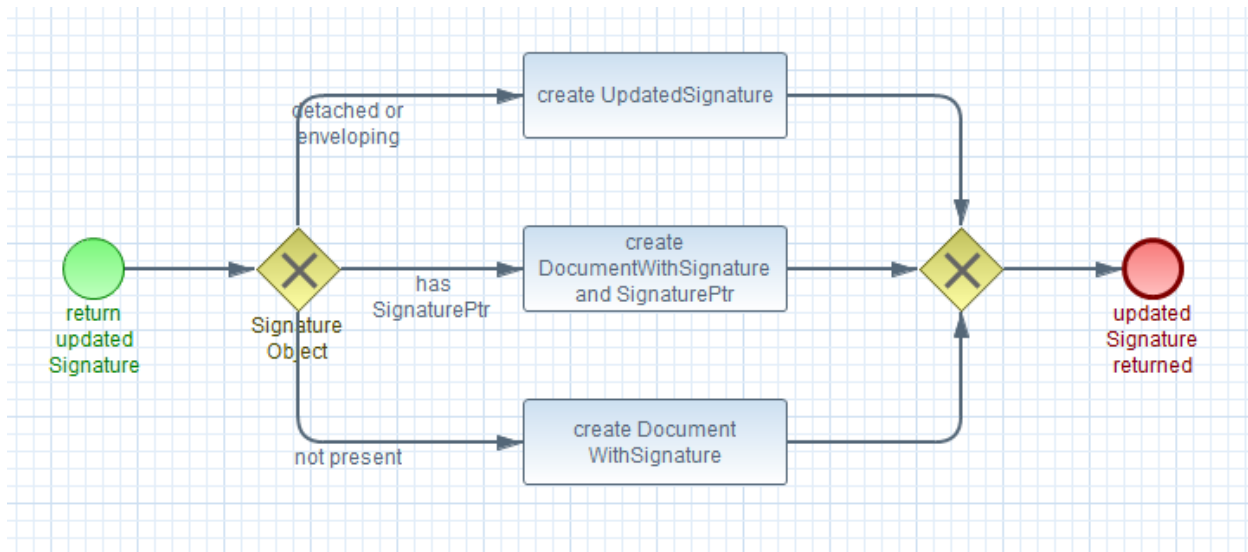
The `Type` element of `ReturnUpdatedSignature` defines the process of "updating" a signature. For example, the updated signature may be the original signature with some additional unsigned signature properties added to it (such as timestamps, counter-signatures, or additional information for use in verification), or the updated signature could be an entirely new signature calculated on the same input documents as the input signature. « Profiles that use this optional input MUST define the allowed values and their semantics, and the default value of `ReturnUpdatedSignature` (unless only a single type of updated signature is supported, in which case the element can be omitted). » **[DSS-6.3.1-1]**

Multiple occurrences of this optional input can be present in a single verify request message. « If multiple occurrences are present, each occurrence MUST have a different value. » **[DSS-6.3.1-2]** Each

occurrence will generate a corresponding `UpdatedSignature` optional output. « These optional outputs SHALL be distinguishable based on their `Type` element, which will match each output with an input. » [DSS-6.3.1-3]

A DSS server SHOULD perform the following steps to return the updated signature appropriately. These steps may be changed or overridden by a profile or policy the server is operating under. (e.g. for PDF documents enveloping CMS signatures).

Figure 15: Select Update Target



- « If the detached or enveloping signature to be verified and updated appears within a `Base64Signature` then the `UpdatedSignature` optional output MUST contain the modified `SignatureObject` with the updated signature. » [DSS-6.3.1-4]
- « If the signature to be verified and updated is enveloped, and if the `VerifyRequest` contains a `SignatureObject` with a `SignaturePtr` pointing to an `InputDocument` enveloping the signature then the server MUST produce the following TWO optional outputs, first a `DocumentWithSignature` optional output containing the document that envelops the updated signature, second an `UpdatedSignature` optional output containing a `SignatureObject` having a `SignaturePtr` element that MUST point to the former `DocumentWithSignature`. » [DSS-6.3.1-5]
- « If there is no `SignatureObject` included in the request then the server MUST produce a `DocumentWithSignature` optional output containing the document with the updated signature, only. » [DSS-6.3.1-6] No `UpdatedSignature` element will be generated.

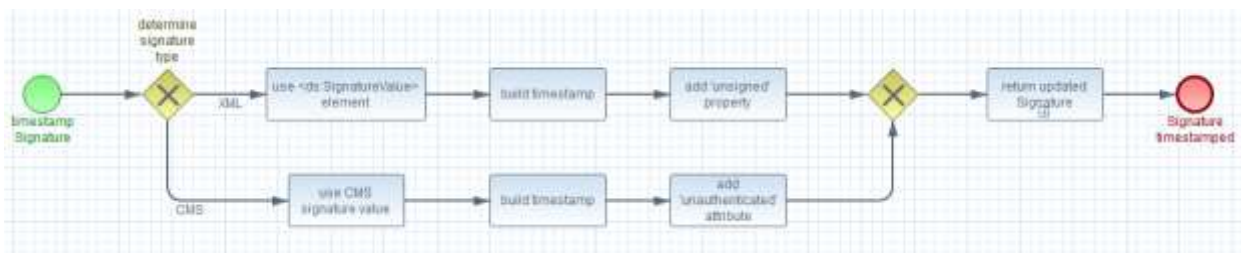
If created the `DocumentWithSignature` optional output contains the input document with the given signature inserted. The server places the signature in the document identified using the `SignatureObject / SignaturePtr / WhichDocument` element. « This `Document` MUST include a same-document `RefURI` element which references the data updated (e.g of the form `RefURI`). » [DSS-6.3.1-7]

6.3.2 Sub process ‘timestamp Signature’

If the `ReturnTimestampedSignature` element of `OptionalInputsVerify` is present the server updates the signature after its verification by embedding a signature timestamp token as an unauthenticated attribute (see "unauthAttrs" in section 9.1 [RFC 5652]) or *unsigned* property (see section 6.2.5 "The `UnsignedSignatureProperties` element" and section 7.3 "The `SignatureTimeStamp` element" [XAdES]) of the supplied signature.

The timestamp token will be on the signature value in the case of CMS/PKCS7 signatures or the `<ds:SignatureValue>` element in the case of XML signatures.

Figure 16: Timestamp Signature



The `Type` element of `ReturnTimestampedSignature`, if present, indicates what type of timestamp to build. This document defines two values for it, namely:

- `urn:ietf:rfc:3161` for generating a RFC 3161 timestamp token on the signature
- `urn:oasis:names:tc:dss:1.0:core:schema:XMLTimeStampToken`, for generating a XML timestamp token as defined in section 5.3 [General Timestamp Processing](#) of this document.

« Profiles that use this optional input **MUST** define the allowed values and the default value for the `Type` element (unless only a single type of timestamp is supported, in which case `Type` can be omitted). » [DSS-6.3.2-1]

The sub process of returning the updated signatures is the same as described in the sub process 'update Signature' (see section 6.3.1).

Note: Procedures for handling other forms of timestamp may be defined in profiles of the Core. In particular, the DSS XAdES profile [DSS-XAdES-P] defines procedures for handling timestamps against the document being signed, and the DSS Timestamp profile [DSS-TS-P] defines procedures for handling standalone timestamps.

6.3.3 Task 'build VerifyResponse'

The task of building the `VerifyResponse` is shared between all signature formats. The `OptionalInputsVerify` element, server configuration and applied policies may affect the set of elements included in the `OptionalOutputsVerify`.

If the `ReturnVerificationTimeInfo` element of `OptionalInputsVerify` is set to 'true' the server returns the `VerificationTimeInfo` within the `OptionalOutputsVerify`. It contains the verification time and optionally other relevant time instants that may have been used when determining the verification time or that may be useful for its qualification.

If the `ReturnSigningTimeInfo` element of `OptionalInputsVerify` is set to 'true' the server returns the `SigningTimeInfo` within the `OptionalOutputsVerify`. It allows the client to obtain the time instant associated to the signature creation. Depending on the applicable server policy, this signing time needs to be qualified, in order to avoid unacceptable measurement errors or false claims, using time boundaries associated to trustworthy time values (based on timestamps or time-marks created using trusted time sources). In this case, the server **MAY** include these values in the `LowerBoundary` and `UpperBoundary` elements, respectively.

Criteria for determining when a time instant can be considered trustworthy and for determining the maximum acceptable delays between the signing time and their boundaries (if any) is outside the scope of this specification.

« When there's no way for the server to determine the signing time, the server **MUST** omit the `SigningTimeInfo` output. » [DSS-6.3.3-1]

If the `ReturnSignerIdentity` element of `OptionalInputsVerify` is set to 'true' the server returns the `SignerIdentity` element within the `OptionalOutputsVerify`. The `SignerIdentity` optional

output contains an indication of who performed the signature. This option is not allowed in multi-signature verification.

If the `ReturnTransformedDocument` element of `OptionalInputsVerify` is present the server returns an input document to which the XML signature transforms specified by a particular `<ds:Reference>` have been applied. The `<ds:Reference>` is indicated by the zero-based `WhichReference` element (0 means the first `<ds:Reference>` in the signature, 1 means the second, and so on). Multiple occurrences of this optional input can be present in a single verify request message. Each occurrence will generate a corresponding optional output. These options are not allowed in multi-signature verification.

The `TransformedDocument` element within the `OptionalOutputsVerify` contains a document corresponding to the specified `<ds:Reference>` after all the transforms in the reference have been applied. In other words, the hash value of the returned document should equal the `<ds:Reference>` element's `<ds:DigestValue>`. To match outputs to inputs, each `TransformedDocument` component will contain a `WhichReference` element which matches the corresponding `ReturnTransformedDocument` optional input element.

If the `ReturnProcessingDetails` element of `OptionalInputsVerify` is set to 'true' the server returns the `ProcessingDetails` element within the `OptionalOutputsVerify`. The `ProcessingDetails` element elaborates on what signature verification steps succeeded or failed. This option is not allowed in multi-signature verification.

7 Asynchronous Processing Model

The main functionality of the 'Asynchronous Processing Profile' [DSSAsync] is included in this version of the core.

The server MAY decide that the processing of a request cannot be performed within a reasonable timeframe and therefore return an instance of the 'Component ResponseBase' with the `ResultMajor` value of

`urn:oasis:names:tc:dss:1.0:profiles:asynchronousprocessing:resultmajor:Pending`

and the `ResponseID` element set to a server generated value.

The client MAY initiate a request with the top-level component `PendingRequest` (see section 4.2.12) from time to time with the `ResponseID` of the initial response included in the `RequestID` element.

If the server is still not able to return the requested response, it will respond with a `ResultMajor` of 'Pending' again. When the server finally succeeds with its processing the results will be delivered to the client with its next polling call. « In this case the `ResultMajor` value MUST NOT be 'Pending' but the `ResultMajor` resulting from the request processing. » [DSS-7-1]

Clients not able to perform the Asynchronous Processing Model MAY treat the 'Pending' response as an error or try to perform the operation at later point in time. Even without referring to the `ResponseID` the server MAY be able to respond with full result immediately.

8 DSS Core Bindings

Mappings from DSS messages into standard communications protocols are called DSS *bindings*. *Transport bindings* specify how DSS messages are encoded and carried over some lower-level transport protocol. *Security bindings* specify how confidentiality, authentication, and integrity can be achieved for DSS messages in the context of some transport binding. Below we specify an initial set of bindings for DSS. Future bindings may be introduced by the OASIS DSS TC or by other parties.

8.1 HTTP POST Transport Binding

In this binding, the DSS request/response exchange occurs within an HTTP POST exchange [RFC 2616].

The following rules apply to the HTTP request:

1. The client may send an HTTP/1.0 or HTTP/1.1 request.
2. The Request URI may be used to indicate a particular service endpoint.
3. « The `Content-Type` header MUST be set to “application/xml” or “application/json”. » [DSS-8.1-1]
4. « The `Content-Length` header MUST be present and correct. » [DSS-8.1-2]
5. « The DSS request message MUST be sent in the body of the HTTP Request. » [DSS-8.1-3]

The following rules apply to the HTTP Response:

1. « The `Content-Type` header MUST be set to “text/xml” or “application/json”. » [DSS-8.1-4]
2. « The `Content-Length` header MUST be present and correct. » [DSS-8.1-5]
3. « The DSS response message MUST be sent in the body of the HTTP Response. » [DSS-8.1-6]
4. « The HTTP status code MUST be
 - a. either set to 200 if a DSS response message is returned.
 - b. or the status code can be set to
 - i. either 3xx to indicate a redirection
 - ii. or 4xx to indicate a low-level client error (such as a malformed request)
 - iii. or 5xx to indicate a low-level server error » [DSS-8.1-7]

8.2 SOAP 1.2 Transport Binding

In this binding, the DSS request/response exchange occurs using the SOAP 1.2 message protocol [SOAP].

The following rules apply to the SOAP request:

1. A single DSS `SignRequest` or `VerifyRequest` element will be transmitted within the body of the SOAP message.
2. « The client MUST NOT include any additional XML elements in the SOAP body. » [DSS-8.2-1]
3. « The character encoding UTF-8 MUST be used for the SOAP message. » [DSS-8.2-2]
4. Arbitrary SOAP headers may be present.

The following rules apply to the SOAP response:

1. « The server MUST return either a single DSS `SignResponse` or `VerifyResponse` element within the body of the SOAP message, or a SOAP fault code. » [DSS-8.2-3]
2. « The server MUST NOT include any additional XML elements in the SOAP body. » [DSS-8.2-4]
3. « If a DSS server cannot parse a DSS request, or there is some error with the SOAP envelope, the server MUST return a SOAP fault code » [DSS-8.2-5]. Otherwise, a DSS result code should be used to signal errors.

4. « The character encoding UTF-8 MUST be used for the SOAP message. » [DSS-8.2-6]
5. Arbitrary SOAP headers may be present.

« On receiving a DSS response in a SOAP message, the client MUST NOT send a fault code to the DSS server. » [DSS-8.2-7]

8.3 Security Bindings

It is good practice to use a security binding (e.g. TLS) to provide confidentiality, authentication and integrity.

The selection of security mechanism and the used parameters depends on many aspects of the usage scenario, for example:

- Required protection level of the content
- Technical limitations (e.g. introduced by mobile clients)
- Regulatory requirements
- Export restrictions

Moreover, these decisions always need to be reconsidered due to new results crypto analysis and known vulnerabilities. Therefore, details regarding protocols and cipher suites are out of scope of this document.

9 DSS-Defined Identifiers

The following sections define various URI-based identifiers. Where possible an existing URN is used to specify a protocol. In the case of IETF protocols the URN of the most current RFC that specifies the protocol is used (see [RFC 2648]). URI references created specifically for DSS have the following stem:

urn:oasis:names:tc:dss:2.0:

9.1 Signature Type Identifiers

The following identifiers MAY be used as the content of the <SignatureType> optional input (see section 3.5.1).

9.1.1 XML Signature

- **URI:** urn:ietf:rfc:3275
- This refers to an XML signature per [XMLDSIG].

9.1.2 XML TimeStampToken

- **URI:** urn:oasis:names:tc:dss:2.0:core:schema:XMLTimeStampToken
- This refers to an XML timestamp containing an XML signature, per section 5.1.

9.1.3 RFC 3161 TimeStampToken

- **URI:** urn:ietf:rfc:3161
- This refers to an XML timestamp containing an ASN.1 TimeStampToken, per [RFC 3161].

9.1.4 CMS Signature

- **URI:** urn:ietf:rfc:3369
- This refers to a CMS signature per [RFC 5652] or prior versions of CMS.

9.1.5 PGP Signature

- **URI:** urn:ietf:rfc:2440
- This refers to a PGP signature per [RFC 2440].

9.2 ResultMinors

The following list contains the values of ResultMinor that are used in this document.

Abbreviation	URI
OnAll Documents	urn:oasis:names:tc:dss:2.0:resultminor:valid:signature:OnAllDocuments
NotAll Documents Referenced	urn:oasis:names:tc:dss:2.0:resultminor:valid:signature:NotAllDocumentsReferenced
Incorrect Signature	urn:oasis:names:tc:dss:2.0:resultminor:invalid:IncorrectSignature
HasManifest Results	urn:oasis:names:tc:dss:2.0:resultminor:valid:signature:HasManifestResults

Invalid Signature Timestamp	urn:oasis:names:tc:dss:2.0:resultminor:valid:signature:InvalidSignatureTimestamp
Referenced Document Not Present	urn:oasis:names:tc:dss:2.0:resultminor:ReferencedDocumentNotPresent
KeyInfoNot Provided	urn:oasis:names:tc:dss:1.0:resultminor:KeyInfoNotProvided
MoreThanOne RefUriOmitted	urn:oasis:names:tc:dss:2.0:resultminor:MoreThanOneRefUriOmitted
InvalidRefURI	urn:oasis:names:tc:dss:2.0:resultminor:InvalidRefURI
NotSupported	urn:oasis:names:tc:dss:2.0:resultminor:NotSupported
Inappropriate Signature	urn:oasis:names:tc:dss:2.0:resultminor:Inappropriate:signature
General Error	urn:oasis:names:tc:dss:2.0:resultminor:GeneralError
KeyLookup Failed	urn:oasis:names:tc:dss:2.0:resultminor:invalid:KeyLookupFailed
CrlNot Available	urn:oasis:names:tc:dss:2.0:resultminor:CrlNotAvailable
OcspNot Available	urn:oasis:names:tc:dss:2.0:resultminor:OcspNotAvailable
Certificate Chain NotComplete	urn:oasis:names:tc:dss:2.0:resultminor:CertificateChainNotComplete

10 Security Considerations

There are several potential avenues for attack when processing incoming DSS documents. The following list is non-exhaustive and should not and can not replace a comprehensive security review.

A comprehensive security review considers the unique technology stack and processes specific to an implementation and not of all implementations.

10.1 Well-Known Attack Vectors

In the following subsections four well-known classes of attack vectors are highlighted:

1. XML Parsing Vulnerabilities
2. XML Canonicalization Vulnerabilities
3. Injection Attacks
4. JSON Deserialization Through Evaluation Attacks

The first two attack vector classes “XML Parsing Vulnerabilities” and “XML Canonicalization Vulnerabilities” can occur in any XML language and therefore do not rely on any specific DSS capabilities.

The third class, “Injection Attacks” applies to any format that is being processed in a deterministic way by an active processor with additional capabilities potentially being triggered by an unexpected and malicious payload.

“JSON Deserialization Through Evaluation Attacks” attack vectors consider processing programming languages and specifically collisions of constructs in the processing language used to consumer any JSON text and the allowed constructs in the JSON format.

In addition to the attack vectors listed and further detailed in the following non-normative subsections, DSS document processing requires interfaces to BASE64 and ASN.1 encoding and decoding in practical implementations, which MAY result in further attack vectors.

10.1.1 XML Parsing Vulnerabilities [non-normative]

There have been vulnerabilities in XML parsing libraries that can cause either denial of service or actual exploits. As an example, see Microsoft’s article on [XML Denial of Service Attacks and Defenses](#). The best defense for these types of attacks is, in short, to keep the XML parser up-to-date and ensure to perform full validation prior to attempting to process the document.

10.1.2 XML Canonicalization Vulnerabilities [non-normative]

Exploitation of the use of canonicalization as content extractor MAY impact an implementation that offers e.g. inclusion and processing of XML Fragments in payloads as described e.g. in [\[JENSEN-2009\]](#).

10.1.3 Injection Attacks [non-normative]

Any DSS content MAY be processed somewhere, thus injection attacks MAY occur in many places which are not specific to DSS. The best defense known, is to sanitize untrusted output (and anything inside a DSS document received from outside the client or server system boundaries should be considered untrusted). For more explanation on injection attacks, see e.g. [this OWASP article](#) (https://www.owasp.org/index.php/Top_10-2017_A1-Injection).

10.1.4 JSON Deserialization Through Evaluation Attacks [non-normative]

Generally, there are security issues with processing languages that are capable to evaluate text in that processing language during runtime and dynamically.

Sample vector for JavaScript:

“JSON is a subset of JavaScript that excludes assignment and invocation. Since JSON's syntax is borrowed from JavaScript, it is possible to use that language's "eval()" function to parse most JSON texts (but not all; certain characters such as U+2028 LINE SEPARATOR and U+2029 PARAGRAPH

SEPARATOR are legal in JSON but not JavaScript). This generally constitutes an unacceptable security risk, since the text could contain executable code along with data declarations. The same consideration applies to the use of eval()-like functions in any other programming language in which JSON texts conform to that language's syntax." (cf. [RFC8259](#) section 12 "Security Considerations").

11 Conformance

11.1 Conformance as a DSS version 2.0 document

To ease communication and subsequent resolution of any specific partial conformance violation, the preceding chapters already provide minimal requirements, that a specific instance component must fulfill, to permit conformance of the complete DSS version 2.0 document.

11.1.1 Conformance for JSON format

The following clause offers a simple two step process, to either prove or disprove the conformance of a complete JSON document (formulated in terms specific to that implementation language) to this version of DSS:

« Conformance Clause 1: “Valid JSON DSS Document”

A JSON document instance conforms to this specification as a DSS document if it meets all of the following COUNT_ME conditions:

1. Is valid JSON
2. Validates against the JSON Schema

» **DSS-11.1.1-1]**

11.1.2 Conformance for XML format

The following clause offers a simple three step process, to either prove or disprove the conformance of a complete XML document (formulated in terms specific to that implementation language) to this version of DSS:

« Conformance Clause 1: “Valid XML DSS Document”

An XML document instance conforms to this specification as a DSS document if it meets all of the following three conditions:

1. Is well-formed XML.
2. Consists of a single root element instance as defined in the namespace `http://docs.oasis-open.org/dss-x/ns/core`.
3. Is valid XML.

» **[DSS-11.1.2-1]**

11.1.3 Conformance for DSS Server

« Conformance Clause 1: “Conforming DSS Server”

A DSS server instance conforms to this specification if the server fulfills all requirements on servers stated in the normative sections of this document. » **[DSS-11.1.3-1]**

11.1.4 Conformance for DSS Client

« Conformance Clause 1: “Conforming DSS Client”

A DSS client instance conforms to this specification if the client fulfills all requirements on clients stated in the normative sections of this document. » **[DSS-11.1.4-1]**

Appendix A. Acknowledgments

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Appendix D. Revision History

Revision	Date	Editor	Changes Made
WD06	2018-06-10	Andreas Kuehne and Stefan Hagen	Initial Draft version with feedback from the TC
WD07	2018-08-12	Stefan Hagen	Minor editorial fixes
WD08	2018-08-13	Andreas Kuehne	Editorial fixes to ease reading for newcomers (grouping of elements)
WD09	2018-08-20	Stefan Hagen	Revision of namespaces
WD10	2018-08-21	Andreas Kuehne and Stefan Hagen	Fix for JSON Schema URL Encoded ref attribute, alphabetical ordering of refereemces, application of OASIS conformance guidelines, addition of Security Considerations section, repair of broken links, and insertion of test assertion tags.